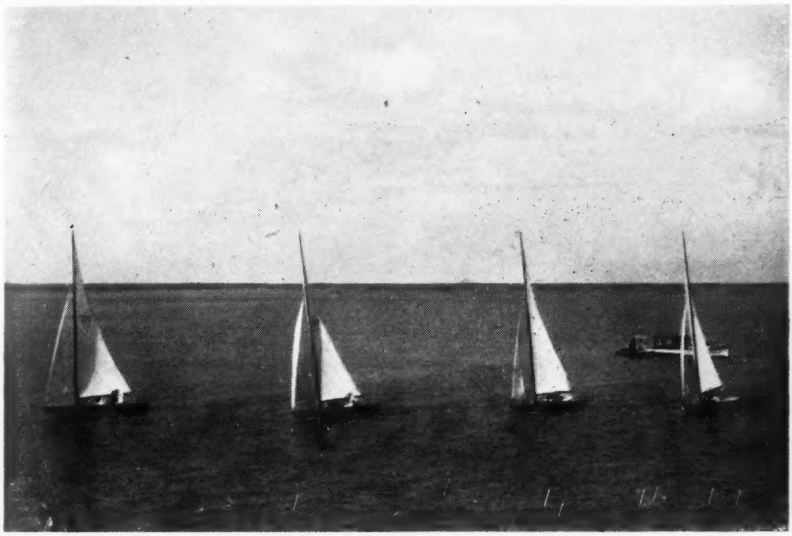
Engineering NOV 4 1943


# ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXIII. No. 3438 OCTOBER 15, 1943 6d. WEEKLY



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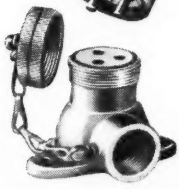

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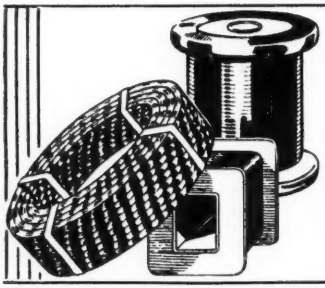

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# ELECTRICAL REVIEW

October 15, 1943

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## Contents :—


| | Page |
|---|---|
| Editorial—One World | 491 |
| Modern Distribution | 493 |
| First I.E.E. Meeting | 498 |
| Telecommunications | 499 |
| Post-War Lighting | 500 |
| Derby's Jubilee | 501 |
| Industrial Accidents | 503 |
| Personal and Social | 505 |
| Forthcoming Events | 507 |
| Factory Power Plant | 508 |
| Correspondence | 509 |
| Commerce and Industry | 511 |

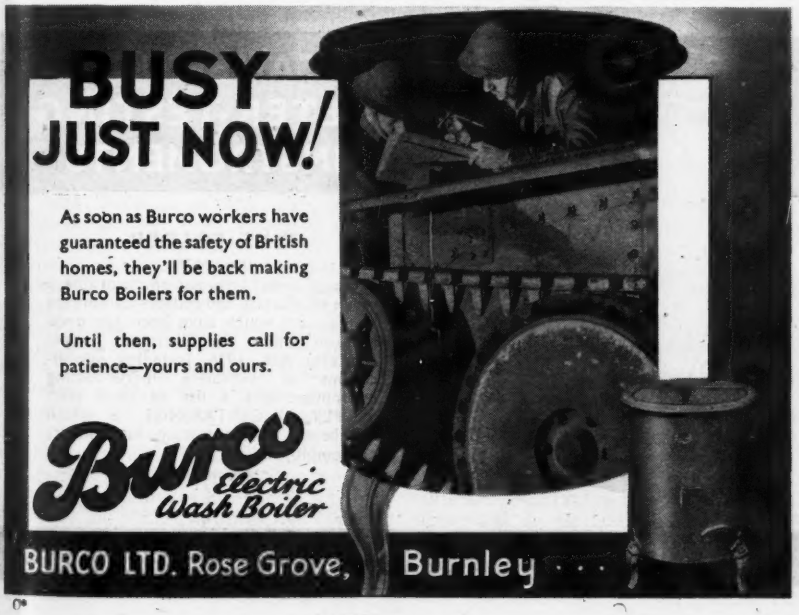
*Contents continued :—*

| | Page |
|---|---|
| Style in Engineering | 514 |
| Engineering Economics | 515 |
| Electricity in South Wales | 515 |
| Call-up of Deferred Men | 516 |
| Recent Introductions | 517 |
| Electricity Supply | 519 |
| Financial Section | 520 |
| New Patents | 525 |
| Contract Information | 526 |
| *Classified Advertisements* | 63 |
| *Index to Advertisers* | 74 |



**EDITORIAL, ADVERTISING & PUBLISHING OFFICES: Dorset House, Stamford St., London, S.E.1.**
Telegraphic Address : "Ageekay, Sedist, London." Code : ABC. Telephone No. : Waterloo 3333 (35 lines).
Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.
Subscription Rates, Postage free : United Kingdom, £1 14s. 8d. ; Canada, £1 12s. 6d. ; Colonial and Foreign, £1 14s. 8d. per annum.
Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank."

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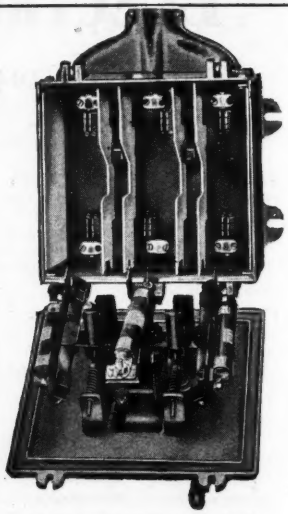

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# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXIII. No. 3438. OCTOBER 15, 1943 6d. WEEKLY


# One World

## *Post-war Telecommunication Opportunities*

IN no field of engineering is international understanding more necessary than it is in telecommunication in its several branches. Indeed, any great advance in this technique, which would give splendid opportunities to British engineers, would appear to depend very largely on the achievement of the requisite co-ordination and standardisation as between different countries. The application of these principles to post-war conditions furnished the theme of Col. Sir A. Stanley Angwin's inaugural address as President of the Institution of Electrical Engineers.

### International Developments

The twenty-one years that have elapsed since an earlier presidential address to which Sir Stanley referred (when Sir Frank Gill laid down a scheme for unified European control) have witnessed many far-reaching developments. They have but made the need for an international outlook the more pressing. Broadcasting, no longer a matter of a few stations of low power, has introduced crucial problems not the least of which relates to the allocation of frequencies. Similarly, with radio-telephony, in which the frequency question is further complicated by possibilities of adapting war developments to normal requirements and by prior claims of transport, since alternative means are not available to ships and aircraft, and of television and picture transmission. Moreover, the inherent technical obstacles encountered by radio communication over long distances are against its superseding line networks in any foreseeable future.

On the other hand, the efficiency of line telephony is limited by the meagre number of channels that can be made available and, for trans-oceanic work, by attenuation in submarine cables, so that radio becomes a necessary link in providing a world service. Considerable improvement in circuit availability on land is, however, to be expected through the adoption of multi-channel-carrier telephony and coaxial cable systems. Across the oceans much can undoubtedly be done by selecting routes that afford a suitable spacing of repeaters or probably through the use of submerged repeaters as an integral part of the cable.

In telegraphy, divergencies between practice in the Old and New World have come about as the result of the building up on the North American Continent of a system ante-dating any large-scale operation in Europe, and this is likely to provide a problem of which the solution will not be easy..

### Standardisation of Performance

International standardisation would not, of course, mean unification of manufacturing methods, but only that the performance of apparatus was of a kind to make unrestricted communication possible. Technical requirements and not political considerations must, the President emphasised, decide the basis for co-ordination (especially with regard to frequency allocations). There is no doubt, however, that agreement between engineers of

individual nations on matters of common scientific interest will materially assist statesmen in promoting international goodwill. In commending the subject to the attention of the Institution, Sir Stanley was speaking in accord with its original main purpose as shown in its first title of the Society of Telegraph Engineers (at a time when the *Telegraphic Journal* preceded the *Electrical Review* as the name of this journal). It would be doubly fortunate if the war were to end while he is still in office and in a position to direct this work on the Institution's behalf.

**Factory Accidents**

IN his Factory Report for last year Sir Wilfred Garrett gives credit to the industry for the fact that, in spite of new hazards and the growing amount of power used, the number of electrical accidents is so microscopic a proportion of the total. That is not all, since, as is shown on a later page, electricity also decreases the number of accidents due to other causes, for instance by the reduction of belting for machine drives and of the number of injurious falls, as well as by promoting the health of the workers through good lighting and ventilation. No doubt the record would have been even better but for the cutting down of "unproductive" maintenance staffs, a policy which Sir Wilfred Garrett suggests might be reconsidered.

**Entomological Inexactitude**

AT a meeting of the Burnley Town Council last week a lady member strongly defended the Electrical Association for Women, who had been described as "a gathering of social butterflies who spend their time drinking tea when they are not listening to lectures." The E.A.W. may be social but they are certainly not butterflies, which are not addicted to tea-drinking and probably hate lectures.

**Another Increase?**

IF the recommendations of Lord Greene's Board of Investigation for the encouragement of greater output from the mines are adopted the cost will be between £2,000,000 and £3,500,000 a year. The proposals are that the present district output bonus scheme shall be superseded either by a pit scheme or a combined district and pit scheme. It is evident that the payment of bonus on a district basis has not had the required results and a greater personal incentive is necessary. The nation must have more coal and apparently it can only have it by paying for it. And so we must expect yet another addition to the price. Let us hope that it will be justified.

**Supply Administrators**

ALTHOUGH we have sometimes complained that there are too many electrical associations we feel bound to admit that there is some justification for the new Electricity Supply Administrative Association whose formation is recorded in this issue. The work of the senior administrative officer of an electricity supply undertaking is of a character for which existing bodies do not seem to cater. The duties are neither purely technical nor purely commercial but partake of both characteristics and they vary in scope from undertaking to undertaking. As a means of enabling these officers to get together to discuss their common problems the new Association should prove of value to the individuals concerned and to the electricity supply industry.

**Public Lighting**

INGENIOUS ideas about fundamentally new methods of street lighting have recently found expression in the lay Press, but they receive no support from those with a real knowledge of the subject. It is clear from statements made at the recent A.P.L.E. Conference and from an article by Mr. J. M. Waldram in last week's *Autocar*, that the most to be anticipated after the war is a continued progress on present lines. This should not provide grounds for complaint, provided adequate financial provision is made in all cases. With the latter is associated the paramount need to eliminate contrasts in illumination intensity from area to area, to which so great a proportion of road accidents at night is to be attributed.

**Tailpiece**

A correspondent draws our attention to a small advertisement which appeared in the *Daily Telegraph* last week offering for sale "several 3 faced motors." He asks if this is a new type of secret weapon. We think that they must either be very versatile or very deceptive machines.

# Modern Distribution

## *Heavy-Supply Substations*

ALTHOUGH it will be some time before the complete picture of the excellent work done by the public supply section of the electrical industry in meeting the demands of the present national emergency can be revealed, we are pleased to be able once again to refer to a particular installation by way of example. It comprises what amounts to the reorganisation of the high-voltage distribution system of a large undertaking to cope with a huge industrial growth, but for the purposes of this article we are concerned especially with the new substations which form part of the reorganisation scheme.

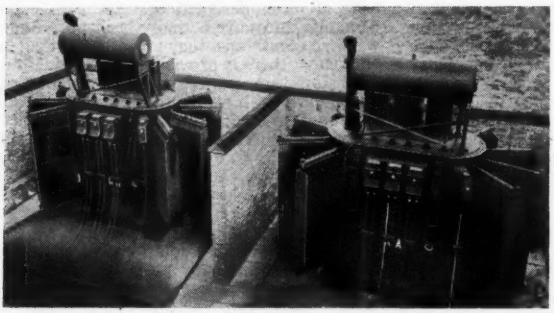
We have selected three of these substations as generally representative of the types adopted to meet the varying heavy-load conditions, and we must emphasise at the outset that, while they have all been designed to meet anticipated demands and have actually been built under wartime conditions, they are of a permanent character; there is provision for considerable extensions; ample space permits easy handling, particularly with regard to the approach and site roads, to deal with such heavy equipment as transformers; and they are of handsome appearance. Coupled with these special features is the great attention which has been paid to such modern conceptions of lay-out as segregation.

**Views of substation, showing spiral exterior staircase and approach road**

The first substation which we describe is representative of the provision made in many parts of the country to-day to meet heavy industrial loads right out in the countryside. It takes its primary supply at 33 kV from the end of a double-circuit steel-tower line insulated for 66-kV working. The line has six cadmium-copper conductors, each with a capacity equivalent to that of 0·1-sq. in. copper, and the normal and maximum spans are 700 ft. and 840 ft. To meet wartime exigencies there is no primary switchgear in this case, and there is direct connection from the lines to two 12,500-kVA, 33/6·6-kV transformers by means of fluted-lead oil-filled cable run down the tower structure and then underground to the transformers.

The B.T.H. outdoor transformers are of welded construction and are well served with high fire walls and

approach roads to facilitate handling. They stand on a sloping raft, at the lower level of which is a trench for the purpose of trapping the oil in emergency. The trench communicates with a quenching pit at either end. The transformers are naturally cooled, each having ten cooling radiators arranged symmetrically around its tank. The oil conservator tank at the top is fitted with a silica-gel breather.



**The transformers are protected by fire walls and stand on a sloping raft with a trench to trap oil in emergency**

The transformers are connected primary delta and secondary star, and arrangements have been made for the easy conversion of the connection boxes at the top to overhead-line connections at a later date when it is possible to install the primary switchgear. "Buchholz" relays are also fitted for the protection of the transformers when that time comes. Each neutral star point is earthed through a resistance of 6·3 ohms.

On the 6·6-kV side each phase outlet from each transformer consists of two 0·75-sq. in. cables in parallel, communicating with the respective busbars of a double-bar ten - panel switchboard (Switchgear & Cowans) *via* two 1,500-A transformer circuit - breakers. There are also one bus-section and seven feeder circuit - breakers. These are all of the horizontal draw - out vertical - isolation type, solenoid operated, and remotely controlled from a control room above the switchroom. The feeder breakers are fitted with Crompton neon potential indicators by which the mains engineer can tell if any one breaker is alive by a feed from the other end when it is "off." All the breakers are equipped with "Fluvent" fuses for the solenoid trips, etc. In common with the other rooms in this and the other substations the switchroom is served by tubular heaters governed by thermostats set at about 55 deg. F.

The control board, also by Switchgear & Cowans, is of the cubicle type with a mimic diagram, embracing rotary circuit - breaker indicators, at the top. Small rotary - type switches on the panels serve for energising or tripping the solenoids of the circuit-breakers. The transformer panels are equipped with an ammeter for each phase, as well as a voltmeter, a power-factor meter and an integrating kWh meter, and there are also over-current and earth-leakage relays for the protection of the circuits. Maximum-load indicators on all the feeder and transformer panels are of the dual-pointer type in which one pointer remains at the maximum reading to date. All the panels have red and green "in" and "out" pilot indicating lights and there are blue and yellow pilot lights for indicating the busbar selections.

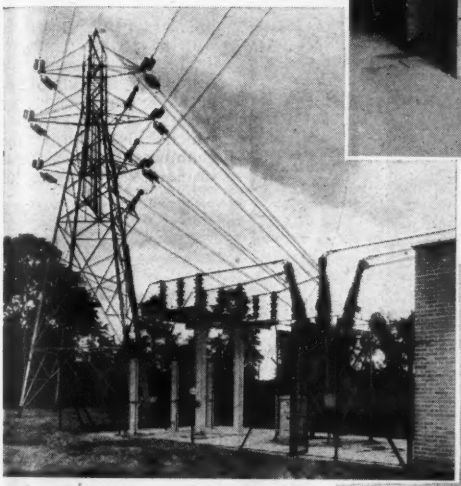
**The 6.6-kV switchgear is of the horizontal draw-out vertical-isolation type; one unit out**

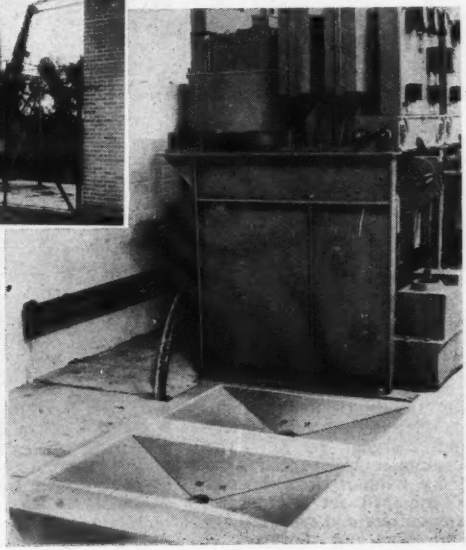
In a separate room and supplying the

operating solenoids of the circuit-breakers is a 125-Ah Britannia steel-alkaline battery which is served by a "Davenset" automatic charger arranged for either trickle- or full-rate charging. A spare room in this substation is reserved for the installation of a transformer and switchgear for low-voltage local distribution if it is required at any time. In common with the other substations the construction is of rough-faced brick with a flat concrete roof, while a notable feature is an exterior spiral staircase for access to the control room on the roof.

The second substation with which we are concerned is generally representative of the type adopted for heavy industrial load concentrations in outlying residential areas. The intake is from a 33-kV steel-tower line at a 60-deg. angle tower equipped with a central screen at the top to enable linesmen to work on one side while the other side is alive. Although in this case primary switchgear has been provided, there is no room for direct overhead connections, so single-core paper-insulated 0·2-sq. in. tapping cables from the end-connection insulators on the towers are run down the pylon structure and then

The vertical-isolation 33-kV switchgear is enclosed in a sheet-steel housing with steel roller shutters





**Above: P.i. cables are run down the pylon and underground to air-break isolators and thence to the 33-kV outdoor circuit-breaker**

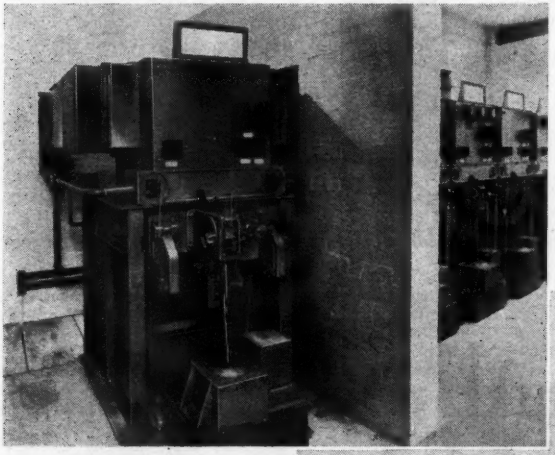
**Right: Immediately under each circuit-breaker the floor is shallowly welled and a hole at the centre connects with a drainage pipe-line**

underground to the end-connection insulators serving three single-pole air-break isolators. These communicate with a simple B.T.H. 33-kV outdoor oil circuit-breaker which is interlocked with the isolating links by means of Castell locks. This switch has a rupturing capacity of 750 MVA and current transformers for the Merz-Price protection are incorporated in the bases of the switch insulators. It is solenoid operated and controlled from a separate unit in the control room.

There is only one outdoor 33/6·6-kV transformer in this case, but it is practically identical with those of the first substation described. Except for the number of units in each, the 6·6-kV switchgear and the corresponding control board are also similar in practically all respects as are the battery and charging gear. The separate control panel for the 33-kV outdoor circuit-breaker is equipped for Merz-Price, over-current and earth-leakage protection and it carries red and green "in" and "out" indicating pilot lights. In this substation we were able to observe the arrangements for draining oil away from the 6·6-kV indoor switchgear in the case of accident. Immediately under each breaker the concrete floor is shallowly welled and a hole in the floor at the centre connects with an underground pipe in line with the switchgear, which communicates with a sump outside the building.

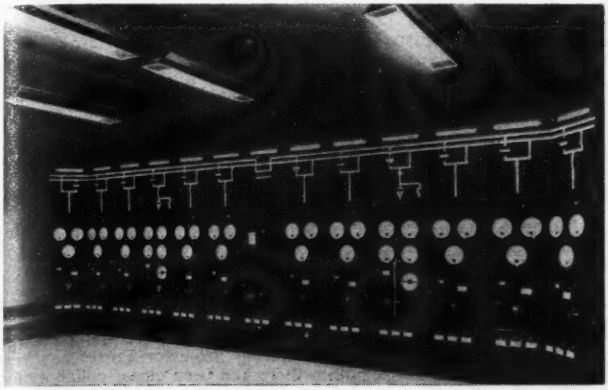
The third substation, which is much larger, is a remodelled installation, but it is generally representative of the type adopted for heavy-load industrial built-up areas, and so it is supplied from an underground primary distribution system (33 kV). The primary intake is at a seven-panel G.E.C. low-oil-content metalclad switchboard of unusual interest. The switchgear is of the vertical-isolation type; the whole is enclosed in a sheet-steel housing, the circuit-breakers being closed in with steel roller shutters.

The busbars consist of condenser bushings connected end-to-end by means of joint boxes which also form the chambers for the spout insulators by means of which the circuit-breakers are plugged into the busbars. Each circuit-breaker can be isolated from the busbars by lowering it vertically, and transferred from one set of busbars to the other by sliding it along rails.



**This 6.6-kV switchboard is "U" shaped, with each leg in a separate room, the busbar chamber at the bend of the "U" passing through an opening in the partition wall. The transformer layout, seen to the right, represents a fine example of the principle of segregation**

The breakers are fitted with arc control pots and each phase is contained in a separate steel tank. The tanks are oval in shape and each is provided with a high-quality tank lining which is wound by a special process from synthetic-varnish impregnated paper and is capable of withstanding the full voltage to earth. A busbar section breaker situated at the centre of this board is separated from the two wings by means of thick brick walls.



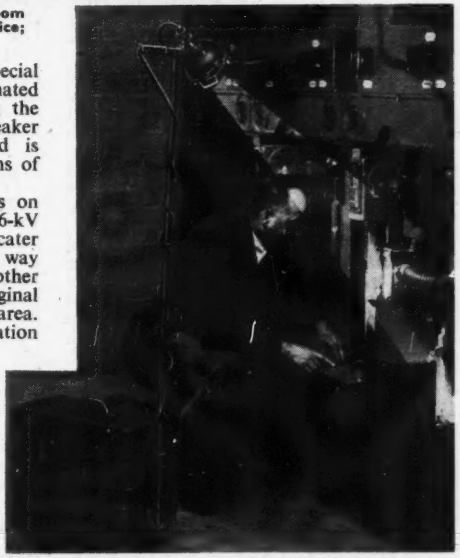
**The floor tiling and lighting of this control room are representative of the general practice; 6.6-kV control board**

The four transformer circuit-breakers on this board serve two 6,000-kVA, 33/6·6-kV E.C.C. transformers, which mainly cater for new industrial load in the area by way of 6·6-kV, three-phase distribution, and other transformers which still serve the original high-voltage distribution system for the area. The transformer layout at this station represents a very fine example of the principle of segregation, with excellent roadways for easy handling. An excellent example of indoor segregation is also to be seen in this substation in the 6·6-kV switchgear. This equipment is of the same type as the 6·6-kV gear in the other substations described, but the layout is entirely different. The board is " U " shaped with each leg in a separate room, the busbar chamber at the bend of the " U " passing through a suitable opening in the partition wall. A busbar section breaker is at the bend end in one room and is separated from the rest of the leg in the same room by a brick fire wall.

The particularly fine control room in this substation measures about 33 ft. by 40 ft. At the moment there are two boards in the room at opposite sides and facing the centre, but cable trenching is provided for extensions right round the room, except for an entrance gap near the door of the room. The 66-kV board is similar to those in the other substations. The 33-kV board is a G.E.C. product.

The last-named board is also similar and has a mimic diagram of the circuits at the top. The floor is covered with 9-in. by 9-in. " Ruabon " buff quarry tiles. The lighting is by three rows of three 80-W " Osram " fluorescent tubes in trough-type reflectors, giving 25ft.-candles at a plane 3 ft. above the floor.

A mobile lighting set is used in each substation for repair or operation work in the event of supply failure. It consists of a 40-Ah " Alklum " battery on castors, while projecting upward from the case is a tubular lamp stand carrying, on a universal joint, a spotlight equipped with a 36-W, 12-V lamp.



**Mobile lighting set for use for repairs in the event of supply failure**

# First I.E.E. Meeting

## *Presentation of New Zealand Awards*

THE opening meeting of the 1943-44 Session of the Institution of Electrical Engineers was held on October 7th ; the retiring President, Prof. C. L. Fortescue, was in the chair. The President said that the first business was the presentation of the Commemoration Medals awarded by the New Zealand Institution of Engineers for an address and a paper contributed by members to the New Zealand Centennial Celebration in 1940. He called upon the High Commissioner for New Zealand, Mr. W. J. Jordan, to make the presentations. (The address was by Dr. A. P. M. Fleming and dealt with " The Influence of Research and Education on the Electrical Engineering Industry of Great Britain," and the paper, on " Practical Aspects of Earthing," was contributed by Messrs. H. W. Grimmitt, G. F. Shotter and E. Fawssett and Dr. H. G. Taylor.)

Mr. Jordan said it was a matter for great regret that the plan drawn up for Dr. Fleming and the four authors of the paper to visit New Zealand and address the New Zealand Institution of Engineers had to be abandoned because of the war. The Institution had arranged for the address and paper to be sent out to New Zealand, and that was much appreciated but New Zealand felt the poorer that representatives of the Institution could not go out there. It was hoped that the congress was merely postponed and would be held at a later date.

Medals for the authors had been prepared but unfortunately they were lost at sea. Other medals were then prepared and they were brought to this country by Mr. Hammond who had been in New Zealand in connection with air raid precautions and other activities.

### Dr. Fleming's Reply

Dr. A. P. M. Fleming thanked Mr. Jordan for presenting the medals and Mr. Hammond for bringing them over. It was a very great regret to the Council of the Institution that the original plans for the Congress for 1940 fell through on account of the war and the authors themselves were particularly disappointed that they had not been able to deliver their address and paper in person.

The President said it would be felt by everybody that this was a somewhat unique occasion and that it would be appropriate to mark it by passing a resolution to be forwarded to the New Zealand Institution of Engineers. A resolution was accordingly passed expressing the Institution's thanks and the hope that when the time was considered appropriate eventually to hold an engineering congress in New Zealand it would be attended with every success. Cordial greetings were sent to all fellow engineers in New Zealand.

The premiums awarded by the Institution for papers presented during the past session were then presented, after which the new President, Col. Sir A. Stanley Angwin, Engineer-in-Chief of the Post Office, delivered his address which is dealt with on the opposite page.

A vote of thanks to the new President was proposed by Mr. J. R. Beard and seconded by Professor S. Parker Smith. Sir Stanley Angwin then took the chair.

### Collaboration between Institutions

Mr. J. S. Highfield, proposed a vote of thanks to Professor Fortescue and this was seconded by Professor E. W. Marchant who said that during Professor Fortescue's year of office there had been closer collaboration between the three principal engineering Institutions than there had ever been before. One great step forward had been that the final examination, first part, for associate membership had been made a common examination for the Institutions of Civil and Electrical Engineers and he hoped that Professor Lea, as President of the Institution of Mechanical Engineers, would also bring that body into the scheme.

Professor Fortescue, acknowedging the vote of thanks, regretted that he had been unable to visit all the local centres. It had been a matter of great satisfaction to him that there had been such close collaboration between the Institution and the two other principal engineering institutions and he hoped there had also been co-operation with the smaller institutions. So far as the associate membership examination was concerned, he could claim little credit for that as the arrangements were in train before he took office.

During the year the Installations Section had been formed and it must be a source of gratification to Mr. H. T. Young, who initiated it, to see the success with which it was working. That success, however, brought with it serious problems for the Institution. There might be further sections to be started and the relation of the sections to the main meetings had to be settled. It was now under discussion and in the not distant future they would be called upon to make a very important decision on policy.

The Institution was a living organism ; there was nothing static about it. It was continually changing and adapting itself to changed conditions, and the more rapid and more flexible the process of adaptation the greater would be its future.

# Telecommunications

## *I.E.E. President on International Standardisation*

PROBABLE post-war development of telephone, telegraph and radio-communication services are surveyed, with the object of emphasising the urgent need for standardised regulation by international control, by Colonel Sir A. Stanley Angwin (engineer-in-chief, G.P.O.) in his inaugural address as president of the Institution of Electrical Engineers.

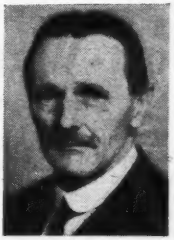
The very great after-war expansion of all means of communication expected throughout the world will accentuate the necessity for standardised service. Hitherto British engineers have always been prominent in the framing of international regulations; they must continue to contribute fully to the growth of facilities abroad, for it will be imperative in the interests of British trade that they keep in advance in technique and take the lead in research.

After indicating the broad framework within which international communications are at present regulated, Sir Stanley next considers probable trends of development in order to gauge how far the existing framework will satisfy future needs. International conventions are so broad in their principles that they may well continue to serve as the basis. The same consideration applies to the Telephone and Telegraph Regulations, probably with some additions to cover new systems of working that may be suitable for adoption internationally. But he is certain that the Radio-telegraph Regulations will have to be modified in order to adjust frequency allocations to new conditions, although he fears that the ultimate solution of the frequency-allocation problem must remain obscure until it is known how far some of the wartime uses of radio can be adapted to peacetime purposes. This problem will be solved only on a rational engineering basis, free from irrational political complications.

### Telephony

International telephony is still very limited in scope; there is not yet the fullest co-operation. The number of channels available is small, while over very long distances continuous radio-communication is not possible on any frequency during certain portions of the day. Bearing in mind the ever-growing demands for space in the ether and the priority which must be given to the mobile services (since marine and aeronautical needs cannot be satisfied otherwise than by radio) Sir Stanley feels that the ultimate demand for long-distance telephony can be met only by more line circuits.

The first possibility is the expansion of land networks, routed internationally irrespective of political considerations, and based on standardised practice and sound technical and economic grounds. Routes could be so selected that islands would shorten the submarine cable links required, or submerged repeaters might be employed. A pair of standard paragutta submarine cables 200 nauts in length affords six circuits; the interposition of four submerged repeaters will provide sixty circuits, without "Vocoder" speech-compression devices, which may have important applications in increasing the number of speech channels obtainable in a cable.



Sir A. Stanley Angwin

A submerged repeater of the Buckley type described in the 1942 Kelvin Lecture has been laid between England and Ireland; it is 5 ft. long and 15 in. in external diameter, weighing 18 cwt., with three valve-heaters in series (0·63 A at 200 V) to which DC is fed from one end of the cable while valve combinations can be set up by switching control devices at the other end. So far its experimental performance has been entirely satisfactory.

### Telegraphy

Modern telegraphy is tending to become wholly transmission by voice-frequency methods, the essentials of operation having been standardised for international teleprinter working. Great Britain has been one of the main users, though other European countries have been gradually changing over from older systems. Practice in the United States has developed independently and does not conform to European standards. The facsimile transmission of photographs and "Telex" service also point the moral of early standardisation for extension beyond single-country confines.

### Radio Services

Possible interference renders it necessary to regulate radio internationally to a much greater extent than line telegraphy and telephony, which need is accentuated by the practicability of utilising relay stations. Radical changes are necessary in the present wavelength allocations. It seems that a reasonable solution of this problem can only lie in the establishment of some order of

priority of user, taking into account the paramount need for wireless as a means of communication for marine and aeronautical services, for which no other alternative is available.

A sound plan for the apportionment of the ether must be based not only on specific allocation to services, but also on such other fundamental principles as limitation of the power of transmitters, regulation of methods of transmission and minimisation of causes of interference. One of the tasks of the future is to ensure that misuse is not continued.

### Television

The necessity for regulation is most apparent in the case of broadcasting, which is closely associated with television. The standard of image definition at present falls short of that accepted for cinematography and indicates the first desirable advance. Both coloured television and stereoscopic projection will make fresh demands on the frequency band required and will necessitate the employment of much higher frequencies for the transmitting carrier.

It is in a developing art, such as television, that international regulation and standardisation require most careful and judicious planning.

New fields that have recently been opened up for radio in the form of aids to navigation, both marine and aeronautical, are now limited to the fighting services; their adaptation to civilian use will offer almost unlimited possibilities.

# Post-War Lighting

## *Functional Design*

A POST-WAR plan for the lighting industry has been proposed by Mr. J. B. Harris. In addressing the Bath-Bristol Centre of the Illuminating Engineering Society he has claimed that all planned illumination must be conducive to cheerfulness and comfort in view of their influence on general health; good lighting must be considered a necessary provision in much the same way as adequate heating and ventilation are.

Modern installations should represent "designs for seeing," except when intended to be entirely decorative in character. Their general designs must be functional, which does not mean that thought is not to be given to beauty of outward form and decoration; ostentatious ornamentation and imitation should be avoided in favour of design based on functional form.

### Compulsory Regulations

He suggests a multi-point plan to make the I.E.E. Regulations for the Electrical Equipment of Buildings the subject of legislation, including State registration of installation contractors and the manufacture of all lighting accessories in accordance with the requirements of British Standard Specifications. The principle of designing industrial reflectors to comply with relevant B.S.S. should be extended to accepted types of commercial fittings, but it would be impracticable to include domestic and decorative fittings. In the last-mentioned cases B.S. Specifications should be concerned with the quality and performance of reflecting and diffusing materials commonly employed in making decorative fittings. In addition the Electric Light Fittings Association might co-operate in the introduction of a "hall-mark" of quality and recommendation.

Differences of opinion exist about the wisdom of extending State regulation to the lighting of commercial buildings, schools, hospitals, libraries, railway stations, public streets, etc., but Mr. Harris considers that legislation is the only means of solving a problem which affects the well-being of the nation. For that reason he advocates extension of the principle, but recognises that any attempt to regulate lighting in houses would be interference with individual liberty. Propaganda is therefore needed in that particular sphere, in closer alliance with opticians whose work is so complementary to that of illuminating engineers.

He pleads that it now becomes necessary to strive for the establishment of a three-year day, or five-year evening, educational course in illuminating engineering to culminate in the award of a university degree in the subject. There is a very definite need for modern textbooks and instructional manuals on lighting theory and practice, specialised British works distinct from those compiled in America.

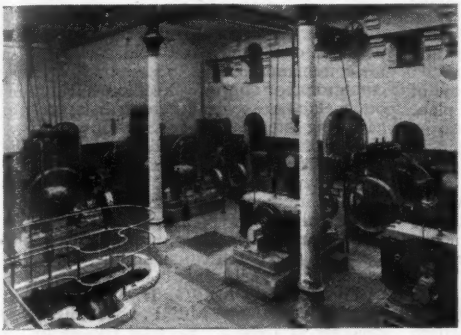
### Control of Research

Mr. Harris also believes that centralised control of illumination research, possibly under the ægis of the Illuminating Engineering Society, would avoid waste of effort; scholarships and university encouragement should be made available as in other professions. An attempt is being made to establish a Department of Ophthalmology in the University of Oxford to undertake research into the prevention of blindness, improved treatment of eye diseases and the promotion of a higher standard of eyesight generally. Among the specific subjects to be studied are industrial, domestic, street and coal mine lighting.

# Derby's Jubilee

## *Progress of the Electricity Undertaking*

THE year 1893 saw the starting up of a number of electricity undertakings which were destined to become some of the most important in the country. We have already referred to the jubilees at Manchester, Huddersfield and Bristol; now the Derby undertaking is the latest to complete fifty years of operation.



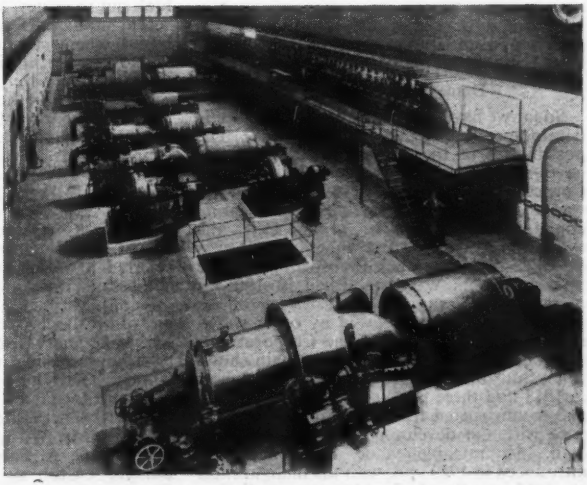
**The original plant at the Derby power station**

In 1890 Derby Corporation was granted an Electric Lighting Order and two years later it was decided to proceed with the erection of a generating station and the installation of the necessary machinery and mains to afford a supply of electricity to the town centre. The approximate cost of the scheme was £30,000 and Messrs. Bramwell & Harris were engaged as consultants to prepare specifications, etc. and to supervise the construction of the station on a site on the River Derwent adjacent to Full Street.

The electricity supply was inaugurated at a banquet on October 10th, 1893, and was made available to private consumers at 100 V, 40 cycles. At the same time a supply for street lighting was also introduced by means of approximately 70 arc lamps connected in series on a 2,000-V, DC supply. The street lamps were run on special 30-HP arc-lighting machines by Siemens Bros., the main contractors for the initial plant and distribution system, who also supplied the three 50-HP machines for private lighting. These machines were direct coupled to Browett Lindley engines.

The distribution system at Derby would seem to have been one of the earliest examples of the ring main system, for in reporting the inauguration of the undertaking at that time the *Electrical Review* recorded that "the mains have been laid on a somewhat novel system, designed by the consulting engineers, Messrs. Bramwell & Harris. It is known for some reason by many as the ring system." The maximum load in the first winter was 20 kW.

That the undertaking was not looked upon with universal approval by the town folk was shown by the opposition to the proposal to spend £5,000 on further plant additions a year after the inauguration of the supply, and an inquiry by the Local Government Board was necessary before sanction was



**A view of the turbine room taken shortly before the war**

given to the expenditure. The undertaking however, gained in popularity and frequent additions were made to the plant in the succeeding years.

The year 1904 saw some radical changes. The reciprocating engines were superseded by three Parsons 300-kW turbo-generators, and the supply to the centre of the town was changed over from 100-V, 40-cycle AC, to 460/230-V DC. With the installation of the new plant the Corporation tramways were electrified. By 1906 the original site had become so congested that preparations were made to erect a new generating station on land adjacent to the original installation and the present station commenced operation on April 9th, 1908.

It is only possible here to refer to some of the major changes which have taken place since that date. Owing to the increasing demands for power load and in order to conform with up-to-date practice the system of supply was changed in 1914, the main generation then becoming 3-phase, 50-cycle AC at 6,600 V. Continuing its policy of keeping abreast with new developments, the Corporation completely reconstructed the original boiler house in 1925 to house pulverised fuel plant, which incorporated the "Lopulco" system of powdered fuel firing, supplied by International Combustion, Ltd. Two Babcock & Wilcox marine type boilers of 60/80,000-lb. evaporation were installed. The steam pressure was raised from 180 lb. per sq. in., 550 deg. F., to 325 lb. per sq. in., 750 deg. F. With the new boiler plant a Parsons 10,000-kW set was installed to operate at the higher steam pressure.

In 1935 the Electricity Committee assumed responsibility for all street lighting, and in 1938 some of the older turbo-alternators were removed in preparation for further extensions to the plant.

### Domestic Development

So far we have said little about the domestic development of the undertaking. The possibilities of the domestic load, however, have always been fully recognised by the Corporation and as early as 1894 an exhibition was held at which electric cooking and heating appliances were shown. Interest in the exhibition was so great that its run was extended from one week to a fortnight. The first showroom was established in 1905 in premises adjoining the Full Street offices and has since been followed by other showrooms in various parts of the Corporation's area of supply. The site for the main showroom and offices in Iron Gate was acquired in 1918 and these premises have been altered and reconstructed from time to time to keep pace with the development of the domestic load. A rateable value tariff was first introduced in 1913 and, with the inauguration in 1925 of the hire-purchase installation scheme for private houses, the domestic side of the undertaking developed rapidly. The 10,000th hired electric cooker was fixed in 1936 and it was only three years later that the 20,000th hired cooker was installed.

The Derby undertaking has had five chief engineers :—Messrs. J. E. Stewart, T. P. Wilmshurst, G. H. Lake, F. Nicholls and the present chief, Mr. F. H. Pooles, and under their respective managements the story of the undertaking has been one of continuous development.

### Jubilee Celebrations

As the jubilee of the undertaking actually occurred on Sunday, last Friday was chosen to commemorate the occasion. Wartime conditions, of course, prevented celebrations on an elaborate scale, but nevertheless a large gathering attended at the showrooms in Iron Gate. Parties were conducted round the power station and afterwards tea was served in the showrooms.

As befitted such an occasion, the speeches which followed were mainly in reminiscent vein. Mr. Morgan, in proposing the toast of "The Derby Electricity Undertaking," welcomed the presence of two former chief electrical engineers, Mr. G. H. Lake (now at Nottingham), and Mr. F. Nicholls (now engineer at Leeds). He paid tribute to the staff and workpeople, past and present, who had so largely contributed to the successful development of the undertaking.

Ald. A. Sturgess (chairman of the Electricity Committee), in responding, reviewed some of the experiences of past years. The station was now too small to cater for the future, and it would be necessary at the appropriate time to look out for a new site for a new building. A recent innovation was the introduction of a bonus scheme for members of the staff and employees for efficiency and useful suggestions. They were also adopting a sick pay scheme which he hoped would eventually be more widely applied.

Mr. F. H. Pooles, who also responded, expressed his pleasure at the presence of many members of the staff who had done good service with the undertaking in years past.

Ald. A. T. Neal (deputy chairman of the Electricity Committee), in proposing the toast of "Chief Engineers—Past and Present," referred to the excellent work of Mr. T. P. Wilmshurst (now with the Electricity Commission), Mr. G. H. Lake and Mr. F. Nicholls and of Mr. Pooles (the present chief), and both Mr. Lake and Mr. Nicholls, who responded, told some amusing stories of their experiences while at Derby.

Councillor G. F. Warburton proposed the toast of "The Visitors," and responses were made by Mr. W. S. Burge (C.E.B.), Mr. G. Bedford (C. A. Parsons & Co.), Mr. E. G. Boissier (Aiton & Co.), and Mr. R. H. Gummer (International Combustion, Ltd.).

# Industrial Accidents

## *Chief Inspector's Report and Mr. H. W. Swann's Notes*

ALTHOUGH there was an increase of 16 per cent. in the number of factory accidents last year, bringing the figure to 314,630, there was a fall of 283 from the previous year in fatalities to 1,363. The annual report of the Chief Inspector of Factories (Sir Wilfred Garrett) for 1942 shows that fewer fatal accidents were attributable to transmission machinery (26 as against 43), partly as a result of turnover to direct electric drives. Factories with the best output were in general freest from accidents. A contributory cause of an increase in the accident rate was the loss of maintenance staff.

The safety provisions of the Factory Acts deal mainly with the prevention of accidents in connection with transmission and power-driven machinery, which are generally more severe than others. These constitute a decreasing proportion of the whole (*e.g.*, 17 per cent. in 1942 compared with 26 per cent. in 1920), indicating the influence of the legal requirements. It is suggested that every factory of considerable size should have a safety committee made up of representatives of management and works and one or more trained safety officers, such as are in successful operation at some works. There has been a growing number of visits to the Industrial Museum in Horseferry Road, S.W.

The Electrical Branch has extended its advisory help to other Government Departments. The total of reportable accidents due to electricity in 1942 was 51 fatal (as in 1941) and 991 non-fatal (117 more than in 1941), the total figure being only about 0·3 per cent. of all accidents reported.

### Heating and Ventilation

Heating arrangements have improved in economy and adequacy as a result of the campaign undertaken by the Ministry of Fuel and Power. Unit heaters have proved adaptable and efficient and possess the added advantage of aiding ventilation. For factories with large floor areas, natural ventilation is not enough and the advice of expert engineers should be sought. Extraction fans in close proximity to air inlets are still common. The Department is willing to assist in solving particular problems or to indicate where advice can be obtained.

It is regarded as most unfortunate that under present restrictions more use cannot be made of fluorescent tubular lighting. In view of the smallness of lighting costs in comparison with the wages bill, the improved production resulting from good lighting and its beneficial effects on the workers, it is considered surprising that more attention has not been paid to improvement of the general standard of illumination by industry in the past. No evidence has been produced of definite physical disability due to working by good artificial light.

### The Electrical Branch

Wartime conditions have once more prevented the issue of the annual report of the Electrical Branch of the Factory Department known as "Electrical Accidents," but the following particulars have been furnished by Mr. H. W. Swann, the Senior Electrical Inspector. Last year there were 1,042 reportable accidents (those involving disablement for more than three days) of which 51 were fatal. Skilled electrical workers were involved in 327 of these, including 10 fatal. In addition, 181 fatalities came to the notice of the Department, 74 of which occurred on domestic or similar premises, ten being in bathrooms and three in air-raid shelters.

The increase of 13·1 per cent over the total number of reportable accidents in the previous year, which was 26·3 per cent. more than in 1940, is attributed in part to the dearth of skilled electricians due to the demands of the Forces, and to the greater fire and explosion hazards associated with certain war industries. Technical assistance in practical detail has been provided by the electrical inspectors to an unprecedented degree. Stringency in the supply of materials has made installation work more difficult but the B.S. War Emergency Specifications are proving valuable.

The accident rate, especially among new entrants to industry and notably among young electricians, has probably followed the increase in consumption of electricity, instead of conspicuously lagging behind it as formerly, and it is essential that instruction regarding risks should be given to such people. Accidents have been due rather to carelessness than to defects in design and often the presence of a second person when making circuits dead would have prevented serious consequences. The value of modern types of voltage detectors to verify whether conductors can safely be worked upon is emphasised. Larger factories could with advantage adopt permit-to-work cards.

Although welding was responsible for the greatest number of accidents in any category (228), it involved no fatalities, but cables and flexibles which came next (199) caused the highest number of deaths (11). Other apparatus concerned in accidents were as follows (fatalities given in brackets):—Switchgear below 650 V, 147 (4); above 650 V, 34 (6); fusegear, 65 (none); portable electrical

machines, 70 (8); other portable appliances, 33 (5); pulleys and adaptors, 38 (1); crane trolleys, 54 (5); fixed lamps, 37 (2); electrical machinery, 21 (4); transformers, 8 (3); electrical ignition of inflammable materials, 8 (1); testing, 52 (0); other apparatus, 48 (1).

Voltages above 650 were involved in sixteen fatal incidents, from 250 to 650 V in fourteen and below 250 V in twenty-three. Lack of uniformity in colouring of flexible cable cores has been responsible for several accidents and the problem is being tackled afresh by the British Standards Institution. Brown, as widely adopted for the earth core, is too near red, from which it is indistinguishable by mercury-vapour lighting.

Apprentices nearing the end of their time may be more fit for responsible work than older up-graded or rapidly trained men, but the Regulations do not permit persons of under 21 years to be employed on certain work requiring technical experience, so the degree of supervision exercised in such cases needs careful consideration. Employment of women is likely to increase, but they have proved reliable in trying emergencies.

### Maintenance Difficulties

Maintenance of plant is a vital issue and as a result of the scarcity of suitable men many firms rely on outside help but, as contractors are also being deprived of their staffs, they can only with difficulty provide routine inspections or prompt aid in emergencies. Equipment of specialised types is sometimes inspected and tested periodically by its manufacturers. The new B.S.I. Code of Practice for Maintenance of Electrical Switchgear is likely to be most helpful.

Overload trips are too often relied upon for the protection of heavy circuits without regard to earth-resistance values and their operation under earth-fault conditions is doubtful. The risk of heating should be guarded against by selecting protective-gear settings in correct relation to the current rating of the circuits to be protected and ascertaining that the resistance of the earth circuit is low enough to ensure fault operation. The present tendency to group circuits on one protective unit on grounds of economy rather than to subdivide, is deprecated.

Explosions have occurred in petrol tanks under inspection due to ignition of vapour as a result of electrical faults or by the heat of the filament of a broken lamp. Low voltage in itself is no safeguard and fittings must be certified as " intrinsically safe " in respect of the specific gas mixtures used. No apparatus, flameproof or intrinsically safe, has been certified for carbon bisulphide risks.

Magnesium powder when rapidly oxidised attains an extremely high specific resistance and can then hold a substantial static charge, which may cause fires or explosions. Aluminium particles are also capable of electrification, but to a lower voltage so that the risk is less. All equipment carrying the powders must be bonded and earthed. Safety in magnesium grinding depends mainly on the working of the extraction and water-spray systems in relation to the starting of the grinding wheel, and the correct sequence of operations must be secured by means of an electrical relay. Naphthalene vaporises at ordinary temperatures; electrical apparatus exposed to its effects should be flameproof.

Particulars given, with comments, of twenty instances of switchgear failures and twenty-one of other failures of explosive violence and/or causing fire show that such occurrences although fewer than in the earlier years of the war are still formidable. Early troubles due to the application of ordinary oil-immersed switchgear to arc-furnace control tend to diminish with increased experience. Air-blast switchgear promises well for a duty which may run into tens of thousands of operations per annum at voltages up to 22 kV, but it must be kept dust free.

The addition of transformers to cope with increasing loads has caused the breaking capacity of medium-voltage switchgear to be exceeded. Often sectionalisation of busbars, reactors or quick-acting h.r.c. fuses (as auxiliary protection) may obviate the replacement of switchgear. The use of back-up fuses calls for investigating into the performance of associated switchgear in relation to the operating characteristics of the fuses and the possible electro-magnetic effects. Where switches or fuses are mounted above a busbar chamber, insulating barriers should be interposed between parts which can be isolated for work and live conductors.

### Welding Risks

With AC welding in which open-circuit voltages of about 100 V are usual, there is serious shock risk through contact with a live electrode or damaged cable. Local isolation by means of heavy plugs and sockets within a few feet of the electrode appears to furnish the best solution. For work on ships, an independent earth circuit carrying a low-voltage circulating current is advisable.

The strongly deprecated practice of " borrowing " a neutral from another circuit of a three-phase system in order to give a phase-to-neutral supply caused a fatal accident. As the neutral was then left connected to another source of supply when its line conductors were isolated, the disconnection of the neutral from its normal earth caused the voltage to rise to phase-to-neutral value through the connections to the line conductors of the circuit from which the neutral had been borrowed.

During the year artificial respiration methods were successfully applied to fourteen victims of shock.

# PERSONAL and SOCIAL

## *News of Men and Women of the Industry*

THE North of Scotland Hydro-Electric Board at a special meeting at Edinburgh appointed a panel of technical advisers to assist it in its first task—the drawing up of the development scheme showing the water power resources which the Board proposed to examine

Mr. J. R. Beard

Mr. S. B. Donkin

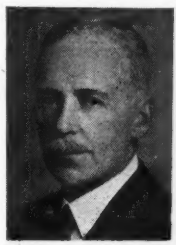
with a view to their possible use for the purpose of generating electricity.

The members of the panel are:—Electrical and mechanical engineers:—**Mr. J. R. Beard,** of Messrs. Merz & MacLellan; and **Mr. S. B. Donkin,** of Messrs. Kennedy & Donkin. Civil engineers:—**Mr. James Williamson,** of Sir William Arrol & Co.; **Mr. W. T. Halcrow,** of Messrs. Halcrow & Partners; and **Mr. Guthrie Brown,** of Sir Alexander Gibb & Partners.

The panel will investigate possible schemes of development in the North of Scotland area, and meet the Board at frequent intervals to report on the progress made in their inquiries. The Board may decide at a later date to add one or two further members to the panel.

At a meeting of the Grimsby Town Council on September 27th the question of the appointment of a chief assistant engineer was discussed. Mr. G. W. Parker, the borough electrical engineer, reported that in view of his appointment as manager it was desirable that a chief assistant engineer should be appointed, and he recommended that **Mr. J. L. Bates,** who had been distribution engineer for the past six years, be appointed and that **Mr. W. C. Stapleton** should succeed him as distribution engineer.

The appointments had already been approved by the Electricity Committee, but Councillor G. W. Thompson, in moving the reference back, said that there were other engineers employed in the undertaking for an equal number of years who had never been given the opportunity of applying for the job. He suggested that the position had never been advertised. He was not objecting to the two men but to the method which had been adopted.



Mr. W. T. Halcrow

Alderman W. H. Thickett, chairman of the Electricity Committee, said that if they took the responsibility from the chief of the Department in the choice of his staff then they could not blame him if it was not a success. The reference back motion was carried by 17 votes to 15.

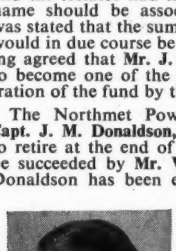
**Pilot-Officer the Hon. John Grimston,** who has just been elected M.P. for St. Albans, is a director of Enfield Rolling Mills, Ltd., and its subsidiaries. He is the son of Lord Verulam.

At a meeting of the Mining Institute of Scotland held in Edinburgh intimation was made of a substantial bequest to the Institute by the late Mr. Sam Mavor. It was explained that, subject to the life interest of Miss Mavor and to provision of certain annuities, it was the wish of the testator to bequeath to the Institute one tenth of his estate, for bursaries or prizes to student members of the Institute to visit places, works or mines of special interest to them. The conditions in connection with the

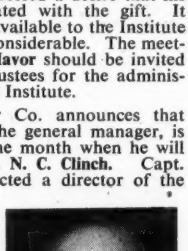
**The Council of the Incorporated Municipal Electrical Association photographed outside the Usher Art Gallery, Lincoln, last month. The president, Mr. F. Newey, is in the centre with the vice-president, Mr. W. P. Litwall, on his right and Mr. J. W. J. Townley, past-president, on his left.** *(I.M.E.A. Journal)*

operation of the bequest would be determined by the president and council of the Institute, and the testator had expressed a desire that his name should be associated with the gift. It was stated that the sum available to the Institute would in due course be considerable. The meeting agreed that **Mr. J. Mavor** should be invited to become one of the trustees for the administration of the fund by the Institute.

The Northmet Power Co. announces that **Capt. J. M. Donaldson,** the general manager, is to retire at the end of the month when he will be succeeded by **Mr. W. N. C. Clinch.** Capt. Donaldson has been elected a director of the



**Capt. J. M. Donaldson**



**Mr. W. N. C. Clinch**

company in recognition of his long and distinguished service.

Capt. Donaldson, who is sixty-six years of age, was educated at Whitgift Grammar School, Croydon, and at the Finsbury and Central Technical Colleges; he is a fellow of the City and Guilds of London Institute. From 1898 to 1901 he was with the British Thomson-Houston Co. and then went to the United States to join the General Electric Co. at Schenectady. Two years later, in 1903, he transferred to the Montreal Light, Heat & Power Co. He returned to England in 1904 and after spending a further year with the B.T.H. Co. as commercial engineer, joined the North Metropolitan Electric Power Co. (now Northmet Power Co.). He served as chief engineer for many years and was later appointed general manager, and in these capacities has been mainly responsible for the extensive development of the Northmet service.

During the last war Capt. Donaldson was awarded the Military Cross. He is a past president of the Institution of Electrical Engineers and a member of the Institution of Civil Engineers.

We published a biographical note on Mr. W. N. C. Clinch in our November 13th, 1940, issue, when he was leaving Brighton to become assistant general manager of the Northmet Co. with whom he had served previously.

On October 6th **Mr. H. Pryce-Jones,** engineer and manager of Brighton electricity undertaking, was installed as president of the Liverpool Engineering Society. He selected as the subject of his presidential address "A Brief History of the Municipal Services of Liverpool."

The L.E.P. Amateur Dramatic Society, by its successful presentation of "Painted Sparrows" (Edward Paxton and Edward V. Hoile) in Manchester on September 30th and October 1st raised £15 for the Lancashire Power Company's War Comforts Fund. **Mr. Stuart M. Rix,** secretary of the L.E.P. Company, in his dual role as chairman of the society and treasurer of the comforts fund, said that it had only been possible to put on such an enjoyable show, with inexperienced players replacing those on active service, through the zeal of the producer, Mr. I. L. Thomas, and the ability of a few experienced members in the cast and behind the scenes. They were gratified at being able to keep the society alive ready for better days and aid the fund which provided comforts to those in the Forces.

**Mr. P. J. Robinson,** city electrical and lighting engineer of Liverpool, who is due to retire shortly, is to receive a superannuation allowance of £2,000 per annum.

**Mr. R. C. Moore,** traffic superintendent in the Liverpool Corporation Transport Department, has been appointed deputy general manager of the Sheffield Corporation Transport Department at a salary of £1,000 per annum.

The marriage took place on October 9th, of **Sqdn. Ldr. F. S. Wainscot,** R.A.F., M.I.E.E., and **Sqdn./O. Collins,** W.A.A.F.

**Dr. W. A. Macfarlane** has been appointed Director of Fuel Efficiency in the Ministry of Fuel and Power.

**Mr. A. S. Pimm,** Osram Lamp Department manager of the Birmingham branch of the General Electric Co., Ltd., retired at the end of September after thirty-five years' service. His successor is **Mr. A. H. Winter.**

## Obituary

**Sir James Fortescue Flannery,** Bart., chairman of Callender's Cable & Construction Co., Ltd., whose death at the age of ninety-one we briefly recorded in our last issue, commenced his career in the office of David Campbell, a Liverpool consulting engineer. He subsequently served five years' apprenticeship in the Britannia Works, Birkenhead, at the same time attending evening classes at the Liverpool School of Science. There he was placed first and awarded the Derby prize, which led to an offer of an appointment with the Admiralty in London. For the next five years he was designing and inspecting machinery, both on land and at sea.

**The late Sir J. Fortescue Flannery**

With this experience he started on his own account as a consulting engineer and naval architect, and later he founded the firm of Flannery, Baggallay & Johnson, which obtained a large and influential practice in London, Liverpool and in Holland. One of his earliest tasks was to design and supervise a new fleet of steamers for the Shell Company. He also effected improvements in the use of liquid fuel in place of coal, new apparatus for the purpose being designed for the Shell fleet. As a result, the use of liquid fuel was adopted in the Navy. On the death of Sir Edward Reid, he was appointed consulting naval engineer and

naval architect to the Crown Agents for the Colonies.

Sir Fortescue had been a director of Callender's since 1904, and chairman since 1912. He was also chairman of Flannery, Baggallay & Johnson, Ltd., and a director of many companies. He was an associate of Lloyd's, and a past-president of the Institute of Marine Engineers, the Liverpool Marine Engineers' and Naval Architects' Guild, and Junior Institution of Engineers.

In 1899 he was knighted, and in 1904 was created a baronet. He was one of H.M. Lieutenants for the City of London and Essex, and was also appointed a magistrate in four counties. He entered Parliament in 1895 as one of the members for Yorkshire, holding the seat until 1906. In 1910 he was returned as member for the Maldon Division of Essex. That seat he held through elections in December, 1910 and 1918 until 1922, when he resigned owing to business calls.

**Lord Meston.**—We report with regret the death on October 7th of Lord Meston of Agra and Dunnottar at the age of seventy-eight. Lord Meston had a very distinguished career in India. He was for about six years Lieutenant-Governor of the United Provinces and was prominent in the drawing up of the Montagu - Chelmsford scheme for the reform of Indian government. Upon his retirement from the Government service Lord Meston became chairman or director of a number of companies including the Calcutta Electric Supply Corporation (the chairmanship of which he resigned last March on account of ill-health), the Galloway Water Power Co., the Sudan Light & Power Co., W. T. Glover & Co., the Wessex Electricity Co. and the Urban Electric Supply Co.

**The late Lord Meston**

**Mr. W. F. Hindes,** who until his retirement in 1940 was wayleaves officer in the Colchester Electricity Department, died recently at the age of eighty.

**Sir Robert Hilton.**—We regret to report the death, on October 10th, of Sir Robert Stuart Hilton, chairman of the British Power & Light Corporation, Ltd., and deputy-chairman and managing director of the United Steel Companies, Sheffield. Sir Robert was deputy-chairman and managing director of the Metropolitan-Vickers Electrical Co., Ltd., from 1919 to 1928. He was made an O.B.E. in 1919 and received his knighthood last year. He was seventy-two years of age.

**Mr. S. T. Drake.**—The death is reported of Mr. S. T. Drake, district superintendent at Stevenage for the Northmet Power Co. Mr. Drake was one of the three men who founded the Stevenage Electric Light & Power Co. He was sixty years of age.

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**Will.—Mr. H. Talbot,** M.I.E.E., of Oaklea, Hambledon, Surrey, formerly city electrical engineer, Nottingham, left £1,628, with net personalty £1,576.

# Forthcoming Events

**Institution of Electrical Engineers.**—Monday, October 25th, 5.30 p.m. Informal discussion on "How Far is International Standardisation in the National Interest?" to be opened by the president.

*Transmission Section.*—Wednesday, October 20th, 5.30 p.m. Chairman's address.

*Measurements Section.*—Friday, October 22nd, 5.30 p.m. Chairman's address.

*South Midland Centre.*—Saturday, October 16th, 12.30 for 1 p.m. Grand Hotel, Birmingham. Wartime lunch and chairman's address.

*North-Western Students' Section.*—Saturday, October 16th, 1.15 p.m. Engineers' Club, Albert Square, Manchester. Luncheon followed by chairman's address (2.30 p.m.).

*North Midland Students' Section.*—Saturday, October 16th, 2.30 p.m. College of Technology, Cookridge Street, Leeds, 2. Chairman's address on "Three-phase Induction Motor Control Gear Practice," by Mr. J. V. Werrell.

*Mersey and North Wales (Liverpool) Centre.*—Monday, October 18th, 5 p.m. Liverpool Royal Institution. "The High-pressure gas-filled Cable," by Messrs. C. J. Beaver and E. L. Davey, B.Sc.

*London Students' Section.*—Monday, October 18th, 7 p.m. "Brains Trust."

*North-Eastern Centre.*—Monday, October 25th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-on-Tyne. "The High-pressure Gas-filled Cable," by Messrs. C. J. Beaver and E. L. Davey, B.Sc.

**Junior Institution of Engineers.**—Friday, October 22nd, 6.30 p.m. 39 Victoria Street, London, S.W.1. "Mechanisation of Mines," by Mr. J. K. Davies.

**Nottingham Society of Engineers.**—Monday, October 18th, 6 p.m. Corporation Gas Showrooms, Parliament Street. Annual general meeting.

**Institute of Fuel.**—*North-Eastern Section.*—Monday, October 18th, 5.30 p.m. Central Station Hotel, Newcastle-on-Tyne. "The Need for Industrial and Scientific Co-operation," by Mr. J. G. Bennett, Director of the British Coal Utilisation Research Association.

**Birmingham Electric Club.**—Monday, October 18th. "Air-blast Circuit-breakers," by Mr. A. R. Blandford, M.I.E.E.

**Derby Society of Engineers.** — Thursday, October 21st, 6.30 p.m. School of Arts, Green Lane. Joint meeting with Inst. Mech. Engineers. "Boilers—Past and Present," by Col. S. J. Thompson, D.S.O.

**Institution of Mechanical Engineers.**—Friday, October 22nd, 5.30 p.m. Storey's Gate, London, S.W.1. Presidential address.

**Association of Mining Electrical and Mechanical Engineers.**—*South Wales Branch.*—Saturday, October 23rd. Pengam. "Mono Pumps in Mining Service," by Mr. F. W. McCombie, B.Sc.

**North-East Coast Institution of Engineers and Shipbuilders.**—Friday, October 15th, 6 p.m. Literary and Philosophical Society's Lecture Theatre, Newcastle-on-Tyne. Presidential address by Mr. J. Ramsay Gebbie, O.B.E., B.Sc.

# Factory Power Plant

## *When Private Generation is Justified*

INDUSTRIAL power supply is the subject not unnaturally considered in the inaugural address of Mr. T. E. Houghton, of I.C.I. (General Chemicals), Ltd., as chairman of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers.

The chairman endeavours to show that while power should generally be purchased rather than privately generated, there are many factories which have to relate their electrical services to the supply of steam. He deals with the thermal efficiency of combined steam and electricity producing plant of the back-pressure type because he has rarely found the subject receiving the attention it deserves. He says that industrialists are too prone to buy their electricity and that suppliers of electricity frequently sidetrack the issue. The facts are inescapable, so no useful purpose is served by depreciating the the performance of such plant. The great majority of back-pressure installations are much more efficient thermally than even the best condensing power stations, but it is frequently argued that when the additional capital expenditure and running costs are taken into account the economics of the case will favour the purchase of energy from public mains; but each case must be investigated on its own merits.

### Governing Considerations

Mr. Houghton's first example, a borderline case of small plant, shows that there is a case for private generation when the load factor exceeds 15 per cent. at the highest tariff and 45 per cent. at the lowest, the comparison being still more favourable when DC instead of AC is required in the factory.

A second example illustrates the economy of local generation although electricity was available to the factory from the owner's private high-voltage AC system in the district, which is furnished by modern high pressure and high temperature condensing stations of relatively large size operating under most favourable conditions at high efficiency and low cost. It is claimed that in this case publicly supplied electricity could not compete and would be against national interests.

The next arrangement illustrated is compounding by the addition of high-pressure boilers and turbo-generators exhausting into existing low-pressure plant, which has been carried out very effectively in private back-pressure stations. The undoubted success of such arrangements both at home and abroad has caused Mr. Houghton to wonder why something similar has not been attempted by public supply authorities in an effort to save some of the low-grade heat now lost in condenser cooling water by supplying hot water or steam instead of electricity for domestic heating purposes.

### Heavy Industrial Loads

Industries that use electricity as a basic raw material, its cost being a major portion of the whole cost of the product, generally have a high load factor and annual usage of the order of that of large cities. In respect of mere magnitude, therefore, there is no reason why private generating stations should not be just as cheap and economical as the majority of public base load stations. In addition the capital cost per kW installed is invariably lower (£12 to £16 against £14 to £21) because public stations tend to be more elaborate than private ones and to provide overmuch standby plant, particularly in boiler capacity. Also the capital cost of services for purchased energy may add from £3 to £5 per kW of demand to the capital cost of a base load station, while distribution losses range between 9 and 11·3 per cent. of energy generated throughout the country.

Private industrial plant need not be handicapped in those ways because production can usually to a very considerable degree be regulated to suit the power available by storing products at times when the demand for them decreases, thus enabling large private plant to be operated with little standby capacity and at very high annual outputs per kW of plant installed. Mr. Houghton's experience is that industrial concerns use far more elaborate costing systems than those of electricity suppliers, the detailed itemised costs at their disposal enabling a very close watch to be kept on the economic performance of plant. In his view it is against both industrialists' and national interests wilfully to ignore facts in the special circumstances dealt with.

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## Power Station Practice

THE Cantor Lectures (in four parts) for 1943 on "The Modern Power Station" are reproduced in the *Journal of the Royal Society of Arts* for September 17th and October 1st. In the first of these issues are included "The Boiler House," by E. L. Luly, and "Coal and Ash Handling Plant," by J. F. Roy Mitchell; in the later issue are "The Mechanical Equipment of the Turbine House," by F. Shakeshaft, and "High-Voltage Power Circuit Control," by C. W. Marshall. Reports of the Lectures appeared in the *Electrical Review* of March 19th and April 9th and 16th.

# CORRESPONDENCE

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.*

## Wasteful Economy

RECENTLY I have had occasion to buy several small electrical domestic appliances. In every case these were fitted with a ridiculously short flex or line cord, three or four feet being the usual length.

Since these cords were inadequate, it simply meant that I removed them and bought flex of the required length to do the job. The retail price of flex is 10d. or 1s. a yard, and it would have been better in every way to have sold the appliances for a shilling less and provided no cord.

These cords have been curtailed by Government Order with a view to economy in flex, but all that results is that the short length prescribed is taken off and wasted. It is a good instance of the futility of Government controls and the waste occasioned thereby.

*Finchley, N.*3. H. B. TUCKER.

[This matter was recently discussed between the E.C.A. and B.E.A.M.A. (*Electrical Review*, September 3rd, p. 306) and it was arranged that manufacturers, through B.E.A.M.A., should supply longer lengths on request.—Editors, *Electrical Review*.]

## Undue Preference

IN reply to Mr. Norman Elliott's letter in your issue of October 8th : (1) I did not challenge wartime increases on the grounds that they are not the same for all consumers (assuming any given area of supply), but I did in fact, see my case "A," challenge the equity of a flat *all-round* increase of 15 per cent.

(2) I agree that the percentage war increase may reasonably be expected to vary as between different classes of consumers in any area and I have not said anything to the contrary. What I have suggested is that in some cases varying increases as between different classes of users appear to have been inequitably applied (see my cases "B" and "C") contrary to the obligations of the "undue preference" clauses of the 1882 Act.

(3) Mr. Elliott may have a more profound knowledge of legal interpretation than I have but it seems to me that he is quite wrong in suggesting that Section 20 does not require that a supply authority may not *increase* its charges in such a way as to show undue preference. An increase in the tariff is but an alteration of the tariff and the consumer is interested only in the final price and as to whether in altering the tariff there is any undue preference, *vis-a-vis* other classes of consumers.

My point is that if the pre-war tariffs were equitable, and there were no suggestion of undue preference, then increases must be equitably applied, otherwise there will be undue preference. In the cases I have cited I can find no suggestion of equitable application of wartime increases.

I do not know how far either Mr. Lesser or Mr. Elliott are informed as to the position throughout the electricity supply industry as to defend the industry *as a whole* by asserting that the obligations of the "undue preference" clauses of the Act have been complied with, but they are merely facts I have cited (and I could cite more) and so far I fail to find anything in Mr. Elliott's letter which undermines my challenge. E. W. DOREY.

*London, W.C.*

## Training for Higher Posts

IN connection with recent correspondence on the above subject, I was interested to note a letter from Mr. T. H. Carr, the chief engineer of Bradford, giving details of a training scheme which has been in operation at the Bradford Corporation Electricity Department for over twenty years. I have suggested to Mr. Carr that a survey should be made of the results of the scheme. In order to do this, Mr. Carr would be pleased if former trainees would write to him giving the positions held by them since leaving Bradford, and stating any professional qualifications which they hold.

I was trained under the Bradford scheme between 1929 and 1932, and am anxious to establish whether such a scheme does meet the requirements for the managerial and executive positions of the electricity supply industry. H. ANDERSON, A.M.I.E.E.

*Stalybridge, Ches.*

## Contract Price Adjustment Formulæ

THE British Electrical & Allied Manufacturers' Association informs us that the latest figures for use in its contract price adjustment formulæ are as follows :—(a) "Rates of Pay."—The rate of pay for adult male labour at October 9th shall be deemed to be 86s. 6d. (no change). (b) "Costs of Material"—The index figure for intermediate products last published by the Board of Trade on October 9th is 171·9 and is the figure for the month of September. The figure for August was 171·8.

## Canadian Battery Sales

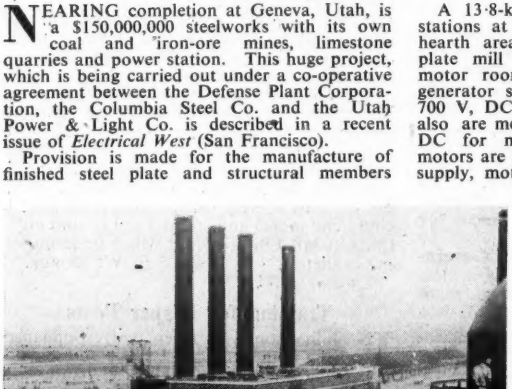
Sales of electric storage batteries and parts by principal Canadian producers were valued at $2,164,541 during the second quarter of 1943 compared with $1,380,480 in the corresponding quarter of last year, states the Dominion Bureau of Statistics.

# American Steelworks

## *Power Interchange Arrangement*

NEARING completion at Geneva, Utah, is a $150,000,000 steelworks with its own coal and iron-ore mines, limestone quarries and power station. This huge project, which is being carried out under a co-operative agreement between the Defense Plant Corporation, the Columbia Steel Co. and the Utah Power & Light Co. is described in a recent issue of *Electrical West* (San Francisco).

Provision is made for the manufacture of finished steel plate and structural members from the raw materials. Four batteries of coke ovens will furnish coke for metallurgical purposes and by-products, and benzole from corollary facilities. Three blast furnaces will supply pig-iron or hot metal to a battery of basic open-hearth furnaces, which in turn will provide steel ingots with which to feed a 45-in. slab mill. Slabs will be further rolled in a 132-in. plate mill and in a structural mill to make finished products.



**Power station under construction at the Geneva, Utah, steel plant**

The power system on the property will eventually furnish a 13·8-kV supply from its own 62,500-kVA generator. Power will be taken from the Utah Power & Light's new 138-kV transmission line recently built to serve the plant until the generating station is completed. After that, the two will interchange, the utility furnishing service when necessary and the generator feeding surplus power into the utility's lines.

A 40,000-kVA bank of transformers, with regulators, reduces the 138 kV to 13·8 kV for supply by underground cable system to the main switchgear located in a switch house.

The 62,500-kVA generator will be driven by a steam turbine, operating at 450 lb. pressure and 760 deg. Steam will be generated by three 300,000 and two 150,000-lb.-per-hr. boilers, burning waste blast furnace gas, with pulverised fuel to supplement this under certain operating conditions.

A 13·8-kV supply is received at unit substations at the coke plant, sinter plant, open hearth area, shops, motor rooms, slab mill, plate mill and structural mill. In the mill motor rooms are located the main motor-generator sets which convert the energy to 700 V, DC for the main drive motors. Here also are mercury arc rectifiers to supply 250-V DC for mill auxiliary motors. Main AC motors are operated from the 13·8-kV, 60-cycle supply, motors between 200 and 1,500 HP at 2,300 V, and those from 1 to 200 HP at 400 V.

Control of the primary distribution system is remote. By means of supervisory control located at the switch house, the operator has control and indication of all primary switching and important secondary switching, as well as control of all primary switching on all lighting circuits throughout the plant. Thus, by opening the main breakers in the substation and motor rooms, complete black-out can be accomplished through the operation of a few remote control switches. This supervisory system permits the substations and motor rooms to be unattended.

All 13·8-kV switchgear on primary distribution is of the air-blast type. This is stated to be the first large steel mill installation with this type of switchgear in the country. Throughout the plant the engineers have minimised the use of oil circuit-breakers.

Total demand by the plant when in full operation is anticipated to be approximately 41,000 kW.

## Supply in Argentina

THE *Revista Electrotechnica*, official organ of the Argentine Association of Electrical Engineers, refers in a recent issue to the increasing difficulty of maintaining electric power supplies owing to the shortage of coal and other combustibles. In this connection it may be mentioned that the Compañia Argentina de Electricidad has issued a notice to its consumers asking them to avoid, as far as possible, using any power between the hours of 6 and 9 p.m.

The Argentine Republic General Direction of Statistics has recently issued a report on the consumption of electric power in the Argentine during the seven years ending with 1941. It is largely based on figures compiled by the Argentine Association of Electric Power Producers and Distributors which are stated to represent 95 per cent. of the total power consumption in the Republic. Consumption increased from 1,487·4 million kWh in 1935 to 2,204·6 million kWh in 1941.

# COMMERCE and INDUSTRY

## *Radio Set Price Control.* *Administrators Organise.*

### Electricians' Wages

AS was stated last week, the addition of 4½d. per hour in respect of the cost-of-living bonus to the wages of operatives in the electrical contracting industry applies only to journeymen 21 years old or above. The National Federated Electrical Association now informs us that for labour under the age of 18, 25 per cent. of the cost-of-living addition will be paid and for operatives between the ages of 18 and 20, 50 per cent. To avoid complications the amounts will be calculated to the nearest farthing and as from the second pay-day in October the rates are 1¼d. and 2¼d. respectively. As with the new journeymen's rate these figures will remain current until the second pay-day in January inclusive.

### Wireless Receiving Set Prices

The Board of Trade has under consideration the issue of a Maximum Price Order whereby the retail price of radio sets at present being manufactured will be set out in a Schedule to the Order. Provision will be made for all sets in the hands of dealers at the date of the coming into force of the Order. It is in the interests of manufacturers that the Schedule should contain particulars of all sets for supply to the civilian market and prices have already been submitted for the approval of the Committee by members of the Radio Manufacturers' Association and by certain other manufacturers. Those manufacturers who have not already submitted their prices, and firms marketing sets for which retail prices have not been fixed by the manufacturers, should communicate immediately with the Central Price Regulation Committee, 41, Tothill Street, London, S.W.1, with a view to securing their inclusion in the Schedule.

### Spain's Electrical Imports

In reproducing statistics of Spanish electrical imports in our issue of June 25th (p. 853) we gave the rate of conversion as 45 pesetas to the £. A Barcelona reader points out that the figures are on a gold basis, *i.e.*, at the rate of between 11 and 12 pesetas per £. This statement has been confirmed by the Board of Trade and in converting the figures to sterling this factor should be used.

### Chinese Engineers for British Workshops

A number of Chinese engineering graduates who are to receive practical training in British workshops were welcomed at the F.B.I. headquarters in London last week. They are the first of a contingent of about 60 men specially selected by a Committee in Chungking appointed by the Chinese Ministry of Education and the British Embassy.

This training scheme was initiated ten years ago by the F.B.I., since when 58 Chinese students have been trained under its auspices with highly successful results. When war broke out the plan was interrupted, but it is now being continued on a larger scale with the encouragement and help of both the Chinese and British Governments. The aim is twofold. On the one hand, the students are provided with a thorough and varied training with British firms engaged in mechanical, electrical and civil engineering. This will enable them to play their full part in the reconstruction of their own country. It is also hoped that they will go back to China with a real understanding of this country.

### L.E.P. Meals Scheme

The April-August issue of the "News Bulletin" of the Lancashire Electric Power Co. describes a scheme for the provision of low-priced meals for its employees which the company has instituted .A sum of £5,000 has been spent on modifying and equipping a building at Westhoughton as a central cooking canteen and in the near future this central canteen will commence to supply hot meals to feeding centres at Westhoughton and Hill Top, Walkden, and cold packed lunches to outside employees through the district centres, when this is practicable. The company is to bear the cost of the staff and will meet other expenses so that meals can be provided at prices practically as low as the bare cost of the food alone.

The same number of the "Bulletin" also reprints the article on "The Supply Industry" which Sir Arnold Gridley, M.P., a director of the company, contributed to the *Electrical Review* of July 2nd last.

### Suction Cleaner Chart

In its home workers' courses in domestic electricity for youth organisations in many parts of the country the Electrical Association for Women has found the girls intensely interested in the construction and working of domestic electrical equipment. This interest also extends to women in the factories and the Services, all of whom are familiar with the labour-saving efficiency of the machine.

The E.A.W. wall charts explaining the construction and use of the main pieces of domestic electrical apparatus have proved such a useful method of instruction for teachers that additions are being made to the series "How it Works." A fourth chart has now been prepared on the electric suction cleaner; it is 20 in. by 30 in., in five colours, linen-backed and varnished, and mounted on rollers, so that it may be hung on a wall or blackboard. It is obtainable from E.A.W. Headquarters, 20, Regent Street, S.W.1, at 3s. 6d. including postage.

### New Administrative Association

Mr. H. Southall, of the Watford Electricity Department, who has contributed a number of articles to the *Electrical Review*, sends us particulars of the Electricity Supply Administrative Association which has recently been formed. He says that full membership is open to the senior officer of any electricity undertaking in the No. 10 Area of the National Joint

Board (Greater London) whose principal duties are administrative in character and who is in addition responsible for the office organisation. Most of the thirty-nine who are eligible have become members.

The object of the new Association is " to raise the standards of commercial practice and administration throughout the electricity supply industry and it is hoped that ultimately the scope of the Association will be extended to the whole country, thereby building a strong and unified organisation capable of assisting the grade of officer for which it caters and the general improvement of the important work he undertakes."

The first chairman is Mr. J. E. Robertson (Hackney). Mr. R. C. Forster (Battersea) has been appointed hon. secretary and treasurer.

## Ship Welding

Technicalities involved in the distribution of power within shipyards for arc welding with AC are treated of in a 19-page illustrated publication (TF/103) of the English Electric Co., Ltd. General principles are dealt with in three sections; first, the total load likely to develop as hull contruction proceeds in welding sheds and at the berths is discussed with respect to typical relationships between numbers of regulators and welders in simultaneous use. Load factor calculations are outlined with the aid of amperage graphs and tabulated data and power factor correction by means of condensers is discussed, also with calculated examples. Secondly, substation equipment and cabling are reviewed with a view to economical choice of sizes and dispositions consistent with minimisation of voltage drop. Finally, the precautions to be observed in 100-V distribution from the step-down transformers to the welding machines are emphasised, particularly as the spacing of conductors has so great an influence on reactance and, therefore, on voltage drop. For this reason it is very important that the neutral cable be carried with the phase cables, which has not been general practice hitherto, adverse welding conditions having consequently resulted. The relative merits of multi-core and single cables are summarised, the advantages of the former being apparent. The effects of varying the power factor are indicated by a vectorial study of the performance.

## Work of St. Dunstan's

The twenty-eighth annual report of St. Dunstan's for the year ended March 31st last shows that 339 men and women blinded on war service have been admitted since the outbreak of the present war. Of these, over a hundred have recovered useful sight and have been able to return to military or civilian life. Of the remainder, 87 men and seven women are now at St. Dunstan's Hospital at Church Stretton, or have been transferred to the Training Centre where they are acquiring normality and independence and later will learn an occupation or profession in order that they may attain economic independence as well.

Of the men who were blinded in the last war, 1,777 are still under St. Dunstan's care. They continue to work cheerfully at massage and telephony, boot-repairing, mat-making, joinery, poultry-farming, basket-making and shop-keeping, in many cases doing work of national importance. A successful experiment made by St. Dunstan's has been the placing of blinded men in industry. As well as a number of newly blinded young people, 110 men of the last war are doing important work in aircraft and munition factories.

## Industrial Administration Conference

A conference on " Management in Action " will be held by the Institute of Industrial Administration from October 22nd to 24th, at the Waldorf Hotel, London. Sir Cecil Weir, Director General, Equipment and Stores (Ministry of Supply) and Viscount Davidson will address the conference, which will examine the responsibilities of executives charged with the functions of production, personnel, marketing and finance.

## Instrument Makers' Handbook

Reorganisation of the Scientific Instrument Manufacturers' Association of Great Britain has caused the preparation of a very useful 53-page handbook containing details of the constitution, aims and business liaisons of the Association. It includes particulars of the extensive range of products of member firms, which are classified in such a way as to indicate in a very convenient thumb-index form the names and addresses of makers of various classes of instruments. It should be emphasised that only the names of actual manufacturers are given, not those of agents or re-sellers. The addresses of allied research and trade associations are included as well as an article historically reviewing the growth of the scientific instrument industry in Great Britain. A strictly limited number of copies of this handbook can be procured through the agency of member firms of the Association upon application to Binder, Hamlyn & Co., River Plate House, 12, South Place, London, W.C.2.

## American Standards

The following American Standards (A.S.A.) have recently been received by the British Standards Institution and may be inspected at the Institution Offices, 28, Victoria Street, Westminster, S.W.1, or obtained on loan :—

Protective lighting for industrial properties (A 85·1-1942); slow-burning wire and cable (C 8·9-1942); cotton braid for insulated wire and cable for general purposes (C 8·12-1942); varnished cloth insulation for lead-covered or braid-covered power cable (C 8·13-1942); metallic coverings for insulated wire and cable (C 8·15-1942).

Revisions to code for electricity meters (C 12WS-1942); loudspeaker testing (C 16·4-1942); volume measurement of electrical speech and programme waves (C 16·5-1942); electrical indicating instruments, 2½- and 3½-in. round flush-mounting, panel-type (C 39·2-1943); power-operated radio receiving appliances (C 65·1-1942).

Transformers, regulators and reactors (C 57·1-1942); test code for transformers (C 57·2-1942); guides for operation of transformers and regulators (C 57·3-1942); fixed mica-dielectric capacitors (C 75·3-1942); weather-resistant (weatherproof) wire and cable (C 8·18-1942); fixed paper-dielectric capacitors (C 16·6-1943); dry electrolytic capacitors (C 16·7-1943);

simplified list of home radio replacement parts (C 16-8-1943); power and audio transformers and reactors (C 16-9-1943).

Rotating electrical machinery on railway locomotives and rail-cars and trolley, gasoline-electric and oil-electric coaches (C 35-1-1943); shock-testing mechanism for electrical indicating instruments (C 39-3-1943); rotating electrical machinery (C 50-1943); measurement of test voltage in dielectric tests (C 68-1-1942); ceramic radio insulating materials, Class L (C 75-1-1943); ceramic radio dielectric materials, Class H (C 75-4-1943); external meter resistors (C 75-5-1943); glass-bonded mica radio insulators (C 75-6-1943).

Graphical electrical symbols for architectural plans (Z 32-9-1943); graphical symbols for telephone, telegraph and radio use (Z 32-5-1942); graphical symbols for power, control and measurement (Z 32-3-1943).

## Agreement at Barrow

Following upon discussions between representatives of Vickers-Armstrongs, Ltd., and of the trade unions concerned it is announced that an agreement has been reached with regard to the question of payment which led to an 18-day strike. The premium bonus system is to be superseded, as from October 16th, by a time piece system.

## Lamp Price List

Siemens Electric Lamps & Supplies, Ltd., 38-39, Upper Thames Street, London, E.C.4, has issued its 1943 revised emergency lamp price list (No. 975) of standard types of lamps.

## Women Engineers' Conference

The Women's Engineering Society will hold its annual conference and annual general meeting at Manchester from October 22nd to 25th. The conference headquarters is Mottram Hall, near Wilmslow, Cheshire, and an attendance of about 100 members is expected. On Saturday the annual luncheon will be held at the Engineers' Club, Albert Square, Manchester, when the speaker will be the Minister of Aircraft Production, Sir Stafford Cripps. The presidential address will be given later at Mottram Hall by Miss G. L. Entwisle, A.M.I.E.E.

## Liverpool Joint Staff Committee

Liverpool City Council has approved the setting up of a joint staff committee to assist in the efficient administration of the public services by the maintenance of good relations between the Corporation and its officers. Serving on the committee will be seven members of the Council and seven full-time officers, members of the professional, technical, administrative or clerical staffs. The functions of the joint committee are advisory only and will include consideration of questions relating to recruitment, training, promotion and conditions of service of groups, but not individual officers.

## Fatality

A verdict of "Death from accidental causes" was returned at an inquest held recently at Orpington on Mrs. Winifred Alice Osborne, who was found dead with two guard wires of an electric fire in her hand. The coroner found that death was due to electric shock which was caused by a defective electric point. Before her death Mrs. Osborne was doing housework and was apparently about to clean the electric fire. The occupier of the house stated that a new element had been fitted by an electrician. Mr. O. Penfold, district mains engineer of the West Kent Electric Co., Ltd., said that a shock could be obtained from the elements. The fire was on a composition floor which was of a conducting nature.

## Dissolution of Partnership

Messrs. J. F. Thomas and J. S. Akroyd, carrying on business as Thomas & Akroyd, electrical engineers and contractors, at 2 and 5, Portland Street, Halifax, Yorks, have dissolved partnership. Mr. J. S. Akroyd will be responsible for debts and will continue the business under the same style.

## Change of Address

The American Chamber of Commerce (together with its publications, *Anglo-American News* and the *Anglo-American Year Book*) is vacating its offices in Bush House at the request of the Ministry of Works. Its new address is Aldwych House, Aldwych, London, W.C.2 (telephone: Chancery 6735).

## Change of Name

Allan Monkhouse, Ltd., have changed their name to Farm & Garden Electrification, Ltd.

## Trade Announcement

The telegraphic address of British Insulated Cables, Ltd., head office, works, and all branch offices in Great Britain, Northern Ireland and Eire is now "Bicobest," and the name of the town.

# TRADE MARK APPLICATIONS

THE following applications have been made for British trade marks. Objections may be entered within a month from October 6th:—

ULTRIC. No. 623,250, Class 7. Electrically actuated wire cutting tools.—Ultra Electric, Ltd., Ultra Works, Western Avenue, Acton, London, W.3. To be associated with No. 622,439 (3402) ix and others.

INSULAM. No. 624,019, Class 7. Machinery parts (not included in other classes) made of composite material consisting of impregnated wood veneer laminations.—The New Insulation Co., Ltd., 125, Bristol Road, Gloucester. To be associated with No. 624,018 (3419) i and others.

METROFLUX. No. 624,011, Class 9. Electrical and magnetic testing or measuring apparatus and instruments for the determination of the presence of flaws, discontinuity or non-homogeneity in materials.—Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.

CUECALL. No. 624,083, Class 9. Sound recording and reproducing apparatus or instruments, but not including sound-producing records.—British Sound & Electrical Co., Ltd., Comedy Theatre, Panton Street, London, S.W.1.

ANCHORS (design). No. 624,179, Class 9. Dry batteries. Brooks & Bohm (Dry Batteries), Ltd., 90, Victoria Street, Westminster, London, S.W.1.

# Style in Engineering

## *Influence of Temperament upon Work*

IN his inaugural address as chairman of the North Midland Centre of the Institution of Electrical Engineers, Mr. W. T. J. Atkins (C.E.B., Mid-East England area, Leeds) reflects that engineering, particularly the electrical branch, is apt to be regarded as a particularly impersonal form of human activity. But there is adequate freedom for the exercise of other faculties more gratifying, although it remains true to say that by comparison with most pursuits electrical engineering demands a very highly disciplined mentality.

The kind of work done by a particular person nearly always reveals the influence of that individual's temperament in some degree, even assuming identity of task and equality of technique. The effect is almost beyond conscious control; in its sum total it determines the sort of work for which the individual is best fitted. Personal style in this sense is not altogether a matter of dismal predestination, because slow changes may modify it, but at any given stage it is as characteristic of the person as is his handwriting. Another aspect is that natural inclination to work only on congenial lines is liable to warp valuation of the achievements of those who prefer different ways; hence faulty judgments are occasionally allowed to escape by reason of early impressions.

### Personalities and Groups

One is thus forced to the humbling conclusion that the individual engineer has as great a need as anyone else to take full account in his daily affairs of our common humanity. Going a step further, it is observable that a group of people closely associated with one another tend to adopt the ideas of the most active, or colourful, personalities in the group, so that their joint methods of working also gradually become differentiated from the general. Such mutual gravitation of ideas is the reason for the adoption of radically different means of dealing with what seem to be similar problems; it causes national predilections in engineering to appear to be almost subject to caprice, or at least fashion, rather than to dispassionate logic.

Electrical engineering is consequently affected by style, but to confine that word to the mere whims, or even to the settled habits, of peoples would degrade its meaning. Style can have rather wider implications which include aesthetic notions like taste, elegance, craftsmanship, regarded wholly objectively. Mr. Atkins believes that engineers may, without impeaching their professional modesty, pay attention to such matters. Indeed he considers it their duty to do this.

But if the individual, however conscientious, dare not trust his own judgment, how will he recognise the superlative quality? Guidance is obtainable by canvassing the views of a number of people with a modicum of interest in, but not any special knowledge of, the subject matter under investigation; if uniformly favourable, it cannot be without good reason. Mr. Atkins does not suggest that test by popularity will succeed with a jury chosen haphazard. He is careful to specify the qualifications of his jurors, and thinks that if reasonable care is taken the reliability of the results will not be denied. The attributes which, in combination, will secure a unanimously favourable verdict in this severe court are a pleasing external appearance, functional aptness, lucidity (meaning choice of simplicity by refusal of every temptation to be ingenious without good cause) and absence of eccentricity.

### Importance of Finish

Nobody will suggest that the sort of uniformity that is evident in purely mechanical timepieces is a symptom of lack of skill, either in design or workmanship, and it is perhaps not insignificant that their excellent technical performance has gone hand in hand with supreme care for finish and appearance. Such patient concern with the detail of mechanisms must also underlie the satisfactory construction of every kind of switching device used in electrical engineering. The mechanical problems involved in the design of switching apparatus are generally of greater importance than the exclusively electrical ones. Similarly, the planning of circuits (meaning layout, both schematically and physically, of systems of wiring) receives less than its due of care. Indeed, every sizeable scheme entailing the selection, assemblage and co-ordination of a variety of components must make demands upon the virtues Mr. Atkins commends, which are also the essence of good exposition, in which respect they are again of material interest to engineers. For instance, in lamentable contrast with Faraday's scrupulous care for detail and regard of perspicuity of expression, Heaviside's writing seems wilfully jumbled and obscure, his graceless practices having led at the time to something like a boycott of his work by established authority.

Thus, in commending the quality of artistry, Mr. Atkins' sole concern is for excellence of craftsmanship, pointing out that manner sometimes counts more than matter and that the finish of one's work is not less vital than its content.

# Engineering Economics

## *Plant Design to General Requirements*

IN the final lecture arranged by the London University on "Engineering Economics," Sir Frank Gill dealt with the design of plant to general requirements, as in manufacture. Such requirements, he said, differed materially from those involved in construction on site (see second lecture), which were confined to a particular job, because of lack of precision in the owner's conditions (*e.g.* a product to be used by many people with different wants) or because quantity manufacture necessitated changes in design. One could design for least first cost and not for least annual charges, or one could compromise to obtain as good a result as possible with varying loads and durations.

When taking plant out of service before its life was exhausted, estimates were required of the value of the plant in place and working, of the annual charges allocated to it that would be available for new plant and of the consequential changes due to the substitution. Caution was necessary in estimating the life and capacity of new plant and also about overheads which might not affect the total charge but only its allocation.

When first cost favoured one plan and annual charges another, he preferred to keep the two values separate (rather than to add them), because they did not offset one another at all times, especially at the beginning, when the owner had to find the money. The two values raised the quite distinct questions of the amount of capital wanted and the financial result.

The engineer was not concerned with accountancy provision for depreciation or with availability of the reserves, nor need there be consistency between mortality and provision for depreciation.

The essentials of scheduling construction work were the carrying out of the work by a certain date and not "as soon as possible," and a thorough knowledge of working conditions and costs for estimating progress. The chief requirement was to be able to estimate, in subdivision of work and time, the condition of each part and the whole at any date. Time lags must be minimised and prompt measures taken to adjust deviations, with a realisation of the effect of delays on the whole or other parts of the work.

Summarising, Sir Frank defined engineering economics as a technique for giving effect to the search for economy and for measuring the economy of plans in order to understand the cost of divergencies from the most economical method. It was not a mere "other study" for adding to the college curriculum, but was vitally necessary to the technical side. Finally, he reiterated Carty's three questions about why *anything*, why *that* way and why *now*, to which he had drawn special attention in his opening lecture.

# Electricity in South Wales

## *Attracting Electro-metallurgical Industries*

LAST week we published an article by Mr. H. A. Sieveking on "Electro-Metallurgical Prospects" with especial reference to Scottish water power. The claims of South Wales to take part in any development in this direction are stated in an article contributed to *Scope* by Mr. W. C. Devereux, chairman of High Duty Alloys, Ltd. His main theme is that the industrial reconstruction of South Wales involves the reconditioning of resources and formulating a scheme of integrated industries particularly suited to development in that area.

A primary consideration is the cost of electricity, which he considers, having regard to the high load factors obtaining in electro-metallurgical and electro-chemical industries, could be generated at 0·16d. per kWh with coal at 15s. per ton (1937 price) and for somewhat less with pit-head generation. A price of 0·13 to 0·15d. per kWh would be attractive to a large electro-metallurgical plant with high load factor and should be obtainable, he thinks, even if this entailed a subsidy recoverable out of revenue from other industries established in the district. This price might partly be met by controlling the load so that it was at a maximum during off-peak periods. Thus, a 10,000-kW arc furnace could be run at full load at night and from half to three-quarters load at other times.

In South Wales the revival or expansion of industries would, Mr. Devereux states, involve less expenditure than would the establishment of transport facilities, foundries, maintenance shops and trading establishments and the moving and housing of workers in the Highlands of Scotland. He proposes that aluminium should be produced by reducing shale in an arc furnace with coke to form ferro-silicon-aluminium which is

afterwards electrolysed to give ferro-silicon and aluminium. In contrast to the Bayer method, the raw materials for this process occur in one locality, the coalfield. Magnesium, which requires 12 to 14 kWh per lb. depends primarily upon the availability of cheap electricity; the raw material, magnesium oxide, is obtainable from the sea.

The remainder of the article discusses the establishment of comprehensive industries depending on coal, including the production of oil and the potentialities of sea-water industries, agriculture, labour, economics and research in the rehabilitation of the area.

# Call-Up of Deferred Men

## *How Electricity Undertakings are Affected*

THE Government recently announced that deferment of calling up would not be continued for men in certain occupations who were born in or after the years 1905, 1910 or 1915 (according to occupation). Most industries are covered, but for the assistance of undertakings the Electricity Commissioners have indicated in a memorandum the principal occupations which affect the electricity supply industry.

Electricity undertakings are being notified by District Man Power Boards of the employees affected by the new arrangement. If assistance is needed in providing a substitute (or substitutes) to enable men to be released, it is essential that undertakings should notify their requirements on the specified form (separately in respect of each such man) to the District Man Power Board within eight days of the notification that the employee has ceased to be deferred. Unless this procedure is complied with the Man Power Boards will assume that the men are available for immediate release. Where the Man Power Board is satisfied that a substitute (or substitutes) is required, arrangements will be made for the Local Employment Exchange to supply the most suitable person (or persons) available.

Arrangements are, in any case, being made for the employees to be called for medical examination at an early date, but where the Man Power Board is satisfied that a substitute is required, the employee will not be regarded as available for calling up until after a substitute has been provided. If the District Man Power Board does not agree that the provision of a substitute is necessary, it will be open to undertakings to refer the matter to the Commissioners, who will consider the representations made, and, if satisfied that an appeal is justified, will communicate with the Man Power Board.

### 1915 Class

Deferment will not ordinarily be granted to men of the following occupations born in or after 1915 (*i.e.*, now aged 28 or under):—Bricklayer's labourer; overhead linesman (not tramways or trolley-bus), linesman; cable layer, service layer (electricity); tester; foreman, charge hand (stationary engine, crane, pump, lift, etc., driver, stoker, etc.); steam turbine driver (electricity generation); stationary engine driver (electric); water turbine driver (electricity generation); stock-keeper, storekeeper (if employed full-time on receipt, custody or issue of stock or stores, *i.e.*, issue, etc., of engineering stores for maintenance and repair work); engineering mechanic's mate (including fitter's mate, millwright's mate, erector's mate, maintenance electrician's mate); other workers (not specified above), fitter, erector, etc. (electrical engineering); estimating clerk; cost clerk, costing clerk; planning clerk; domestic appliance maintenance superintendent (electricity supply); chief technical officer (meters); inspector, assistant inspector (installation, meter, substation), mains foreman; auxiliary plant attendant (electricity supply); draughtsman (others); cost and works accountant; accountant (other) (not a member of an incorporated society); general manager, works manager, assistant manager, factory manager and production department manager.

### 1910 Class

List of occupations for which deferment will not ordinarily be granted to men born in or after 1910 (*i.e.*, now aged 33 or under):—Carpenter and joiner (general hand); carpenter fixer (building); carpenter joiner's labourer; bricklayer building (general hand); plumber (general hand); plumber's labourer, plumber's mate; switchboard attendant, control room attendant; cable jointer's mate; fireman, stoker, boilerman; telpher driver; winch driver; donkeyman, donkey engineman; fireman, wholetime (not N.F.S.); first-aid attendant (wholetime) (mobile party); chief clerk, senior clerk; chief cashier; progress clerk, progress chaser; wages clerk; commercial goods vehicle (1½ to 2½ tons unladen weight) driver (excluding truck driver); coal trimmer; meter fixer; meter tester; other local authority officer and company secretary.

### 1905 Class

List of occupations for which deferment will not ordinarily be granted to men born in or after 1905 (*i.e.*, now aged 38 or under):—Domestic appliance repairer (not stripper), electricity undertakings; electrician's, overhead linesman's, wireman's labourer or mate; hoist driver; oiler, cleaner (stationary engines, cranes, pumps, lifts, conveyors and other similar machinery); first-aid attendant (fixed post), rest room attendant; general clerk; statistical clerk; ledger clerk, accounts clerk; stock-keeper, storekeeper (if employed full time on receipt, custody or issue of stock or stores) (excepting Admiralty employees); commercial goods vehicle (under 1½ tons unladen weight) driver (excluding truck driver); and foreman, stock-keeper, storekeeper (excluding engineering and metal trades) (excepting Admiralty employees).

## New Finnish Radio Station

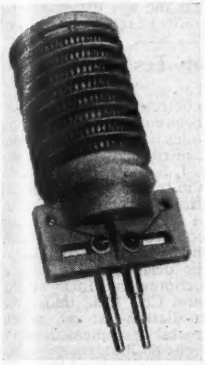
A broadcasting station has been completed at Rovaniemi, capital of Lapland, according to a Helsinki message to the German News Agency, quoted by *Reuter*.

# RECENT INTRODUCTIONS

## *Notes on New Electrical and Allied Products*

### Bowl-Fire Element

AN unusually designed bowl fire element which is known as the ABM type is offered by METWAY ELECTRICAL INDUSTRIES, LTD., King Street, Brighton, Sussex. The spiral wire element of 600 W at 230/250 V is wound on to a grooved ceramic former, to the slotted base of which are screwed

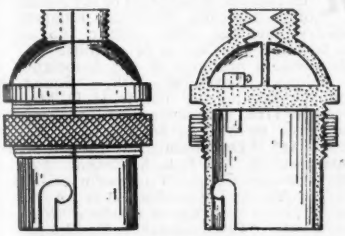


**Bowl fire element with multi-diameter plug pins**

two "multi-pins" of stepped diameters, making them suitable for plugging into ¼, ⅜ or ½ inch sockets. As the smallest size of plug is not very often required a groove has been cut in each of the smallest sections to enable the extremities of the plugs to be easily nipped off with pliers, thus shortening them to enable either of the two larger sections to be inserted in a socket. It will be noticed that the two screws which secure the terminal ends of the wire element to the slotted base of the former also hold the plug-pins in position; thus by slackening the screws the spacing apart of the pins may be adjusted to suit the socket holes.

### Improved Lampholder

Details of a newly designed lampholder announced by S. D. SULLAM, LTD., 72, Newman Street, London, W.1, show that while it is similar in appearance to most others of the moulded type, its construction represents an improvement.



**Longitudinally split moulded lampholder**

According to British patent 545,797 the holder is divided longitudinally, and the two parts, each formed with a rebate, are neatly locked together by a ring screwed on to the threaded portion, to which can also be added a shade ring if desired. The upper end of the holder has a short neck, which is an integral cord grip.

The advantage of this design is its convenient assembly, which facilitates re-wiring, for removal of the rings parts the holder longitudinally (not laterally) allowing the wires to be easily attached to the terminals without awkwardness. The two halves of the holder are then simply closed and the rings replaced, resulting in the saving of time and, in addition, the simplification of construction means that the holder may be quickly opened and closed for inspection of the leads. It is designed in three styles, all on the same principle, for bayonet-cap and Edison screw fitting and as a batten holder. Supplies will become available as soon as conditions permit.

### Bimetal Battery Cans

The usefulness of dry battery cells can be extended by coating their zinc cans externally with lead to protect them against electrolytic attack, but difficulties encountered in making such cans at a low enough cost with a layer of lead sufficiently thick to be effective have prevented commercialisation of this fundamentally sound idea. Whether such cans are made by drawing, impact extrusion, or the soldering of flat sheets of zinc, they have to be at least 0·01 in. thick in order to enable them to be formed into shape without risk of premature perforation, although a mere fraction of the zinc usually provided is actually needed for cell-functioning, the surplus representing considerable wastage of metal.

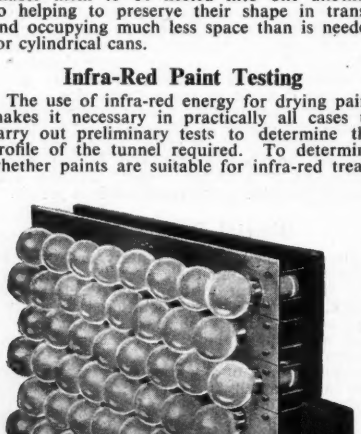
**Bimetallic foil dry battery can**

All these awkward factors are avoided in an unusual manner by ANDERSEN & BRUNN (BRITISH), LTD., Edinburgh Avenue, Trading Estate, Slough, Bucks., in the "C.J.B." can which they have introduced. This consists of sheets of metal foil, externally of lead and internally of zinc, formed into cup shape by folding into a multitude of radial pleats and compressed to a substantially smooth wall surface with the two portions securely interlocked along the folds. This method enables very thin metal sheets to be employed, the amount of zinc being almost exactly adapted to the actual consumption throughout the cell's active life. The quantity of zinc utilised is thus only a fraction of that which is normally required and even the combined amount of zinc and lead is substantially below the usual.

Single or several perforations of the zinc lining will not affect the continued functioning of the cell, since seepage of the electrolyte will be minimised by the protective lead sheath. For building up into high-voltage batteries for radio sets the necessary series connection wire can be affixed to a bimetal can by clamping it in between the two foils, with or without the aid of solder. The cans are made slightly conical to enable them to be nested into one another, so helping to preserve their shape in transit and occupying much less space than is needed for cylindrical cans.

## Infra-Red Paint Testing

The use of infra-red energy for drying paint makes it necessary in practically all cases to carry out preliminary tests to determine the profile of the tunnel required. To determine whether paints are suitable for infra-red treatment, it is essential to have some form of convenient test equipment by means of which the energy flux falling on sample pieces can be regulated within narrow limits.



Paint-drying infra-red test bank

For this purpose the BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London, W.C.2, has designed a flat bank 35 in. square of 72 " Mazda " IRI 250-W lamps, backed by a surface made up of strips of reflecting material. The lamps are so connected that if necessary those on the periphery can be controlled separately from the rest, thus providing, if required, a smaller square of 42 lamps.

The testing procedure is to paint a sample piece of sheet metal, say 6 in. square, and hold it centrally in front of the bank. By fixing a thermocouple at the centre of the test piece it is easy to determine the temperature at which paints polymerise and bake. In a practical tunnel limiting features often prevent the use of the very high temperatures available by means of infra-red energy. Thus, the presence of a soldered joint will limit the safe temperature to something under 350 deg. F. In such circumstances there would be little purpose in supplying a paint which requires a much higher temperature for rapid and successful polymerisation or baking.

On the sample piece the energy intensity is uniform. Due to the possibility of moving test pieces to any desired distance from the bank the intensity, usually expressed in watts per sq. in. can be varied within wide limits. A further advantage is that the test pieces can be so placed that visual control can be maintained.

## Insulation Testing

THE value of frequent routine tests of insulation with a view to detecting incipient causes of breakdown has been emphasised in Section 8 of British Standard Codes of Practice, BS 1086-1942. In an article contributed to our issue of July 25th, 1941, Mr. J. S. Forrest referred to the practical difficulties in regard to the essential portability that were introduced by the cumbrous nature of the equipment needed for power-factor tests, and described a compromise between such equipment and the simple, but limited, insulation-resistance set. The design then proposed has now been put into commercial form by the British Thomson-Houston Co., Ltd., under the name of the Forrest insulation-test set, which is self-contained in a metal case measuring 19 by 14 by 8¼ in. and weighs 60 lb.

Briefly, the set is energised from the 230-V AC mains, the voltage being stepped up and rectified by a standard h.v. valve. In the return of the DC output connections to the apparatus under test is a variable resistor, the voltage across which is applied to the control-electrodes of a cathode-ray tuning-indicator (" magic-eye ") valve. The resistance is varied until the shadow angle of this valve registers a known value. From the characteristics of the valve, the voltage across the electrodes is determined and the insulation value is derived from a calibration chart. The DC voltage is variable in steps of 1, 2, 3, 4 and 5 kV and resistances up to 20,000 mΩ can be measured at 5 kV.

## Supervisors' Programme

MR. H. W. SWANN, M.I.E.E., is to deliver his address as president of the Association of Supervising Electrical Engineers on Tuesday, October 19th. Before the address two technical films are to be exhibited.

Subsequent meetings of the Association are as follows:—November 13th, " Sound Reproducing Equipment," by Mr. H. D. Murdock. December 11th, "Converting and Rectifying Plant Problems," by Mr. A. M. Brown, A.R.C.Sc.I. January 8th, " Developments in Electro-Medical Apparatus," by Mr. J. L. S. Baxter. February 12th, " Remote Control Equipment and Operation," by Mr. A. T. Crawford, B.Sc., A.M.I.E.E. March 21st, " Electric Resistance Welding." April 18th, " Circuit-breaker Development in Switzerland," by Mr. G. A. Meier. May 16th. Three winning papers from the Branch Papers Competition, 1943-44.

The meeting place on November 13th will be Magnet House, Kingsway, W.C.2. Other meetings will be held at the Lighting Service Bureau, Savoy Hill, W.C.2.

# ELECTRICITY SUPPLY

## *Manchester 60,000 kW Set. Higher Prices in Eire.*

**Chester.**—SUPPLY TO FARMS.—The Electricity Committee has obtained sanction to provide supplies to farms at Pulford and Dodleston.

**Cheltenham.**—SUPPLIES TO FURNISHED HOUSES.—Agreements for the supply of electricity to furnished houses are entered into with the landlord. If the supply has been disconnected through a former tenant not having paid his account and the landlord refuses to pay the necessary deposit for reconnection hardship is caused to the incoming tenant. This matter was mentioned by the borough electrical engineer (Mr. R. W. Steel) at a recent meeting of the Electricity Committee. He was authorised to use his discretion in permitting the supply to be reconnected for tenants of furnished rooms subject to the supply being taken on the domestic tariff and to a sufficient deposit being paid by the sub-tenant.

SECOND-HAND COOKERS.—The Electricity Committee has agreed to purchase 78 second-hand electric cookers from the Bethnal Green electricity undertaking at a cost not exceeding £500.

**Dumfries.**—DISPOSAL OF SURPLUS PLANT.—The convener of the Electricity Committee reported to the Town Council recently that surplus plant at the works had been for sale and the Committee had received a very good offer for two lots, the total amount being £5,100, which was accepted. The plant would go to a British Colony, where it would be of much more service than it would at Dumfries. Their thanks were due to Mr. A. E. Roots, their engineer, for what he had done in connection with this sale.

**Edinburgh.**—MODIFIED LIGHTING PERMITTED.—The announcement on October 8th that Mr. Herbert Morrison, Minister of Home Security, had relaxed the veto on street lighting in Edinburgh came as a complete surprise, following his statement at a Press conference in the city the previous week that in the view of the Air Staff and himself there could be no modification at present. Lights can now be installed subject to the approval of the City Council. It will be recalled that the Council on September 23rd referred back to the Streets and Buildings Committee a recommendation that, subject to the approval of the Ministry of Home Security, a system of modified street lighting should be provided in the central areas of the city.

**Manchester.**—POWER STATION EXTENSIONS.—The Electricity Committee reports the receipt of a direction from the Central Electricity Board to extend the Stuart Street power station by the installation, ready for commercial operation if practicable by September, 1948, of a 60,000-kW turbo-alternator complete with ancillary plant.

LOAN SOUGHT.—The Corporation Electricity Committee is seeking sanction to borrow for substation extensions.

**London.**—STREET LIGHTING PLANS.—Poplar Electricity Committee has approved provisional arrangements for the resumption of public lighting at the earliest possible date.

**York.**—SANCTION FOR LOAN.—The Electricity Committee has obtained sanction to borrow £1,250 for substations and equipment.

### Overseas

**Eire.**—RESTRICTIONS RELAXED.—In view of the favourable water conditions obtaining in the River Shannon the Electricity Supply Board has revoked the limitations imposed on consumers on May 18th last. These have been replaced by the following revised restriction: the total consumption for all purposes of any consumer (excluding industrial power consumers) shall not exceed in any day the average daily total consumption for all purposes of the consumer upon the same premises in the corresponding accounting period in the year 1941. Though no restrictions are thus placed on industrial users, the Board emphasises the need for such consumers to economise.

DEARER ELECTRICITY. — The Board has announced increases in charges to come into force on November 1st. The following are the details of this "second emergency increase": public lighting and slot meter, current limiter, coin limiter and unmetered supply charges will be advanced by 10 per cent. and for all other supplies a 20 per cent. increase will be substituted for that of 10 per cent. already in force.

These higher charges were foreshadowed in the Board's recent annual report which stated that owing to restrictions revenue could not be increased on the basis of existing charges. There was a deficit last year of £58,963 and the contingencies reserve, which was drawn upon to reduce the debit balance carried forward, was thereby exhausted.

**New Zealand.**—SEVERE SNOWSTORM.—Considerable damage was done to power supply systems in both islands on June 30th by one of the worst snowstorms experienced for many years, states the *New Zealand Electrical Journal*. In one district the snow reached a depth of 4 ft. and a week after the fall some E.P.B. lines were still coated with 2 in. of radial ice (4 in. outside diameter). Mr. A. Buckingham (North Canterbury E.P.B.) stated that the storm was the worst in the Board's experience and caused the total breakdown of supply for eight hours; in the supply to Culverden there was a total outage of 59¼ hours. He suggested that it might be prudent to strengthen some of the main and secondary feeders, and Mr. H. G. Kemp (Ashburton E.P.B.), in whose area some 170 miles of branch lines were still out of action ten days later, also thought that it might be necessary to revise present ideas on construction standards.

**Sweden.**—WATERFALLS BOARD'S PROJECTS.—The Swedish Waterfalls Board has asked for a budget allowance for the financial year beginning July 1st, 1944 of 35·2 million kr. and a supplementary allowance of 5·6 million kr. A sum of 6·5 million kr. is required for the construction of the Midskogsforsen power station, 7 million kr. for building a station at

Nämskogsforsen, 2 million kr. for a power station on the Forsmoforsen, 1 million kr. for the enlargement of the Porjus plant, 700,000 kr. for the Leringsforsen station, 1 million kr. for the regulation of the water supply from lakes fed by the Ångermanälven river, 2 million kr. for works of the same kind on the Indaelsälven river, and 15 million kr. for the extension of the power distribution system. Of the supplementary allowance, 1·75 million kr. is intended for continued works on the Torpshammar station, 400,000 kr. for the Hojum station at Trollhättan, 2 million kr. for the Midskogsforsen station, 800,000 kr. for the regulation of the water supply from the Holmsjön and Leringen lakes which are supplied by the Ljungan river, and 650,000 kr. for increasing the height of the Suorva dam.—*Reuter's Trade Service.*

# TRANSPORT

**Glasgow.**—TRANSPORT "SATURATION."—Present indications are that the city transport system has now reached saturation point, and that the undertaking cannot carry any more passengers unless more vehicles are placed on the road. Such a course might mean "selection" of passengers, with special consideration for war workers. This was one of the points mentioned by Mr. E. R. L. Fitzpayne, general manager of the Transport Department, when he spoke on October 8th on "War-time Difficulties in Passenger Transport." Last year, he said, the system carried 725 million passengers, which was 73 millions more than in 1938-39, with 8,500,000 fewer road miles. Absenteeism and sickness among transport employees had reached alarming proportions and during the summer there was an average daily shortage of staff of between 400 and 500. Yet he did not accept the general complaint against their employees. There were a number of "black sheep," but the vast majority, especially the tram drivers, were doing splendid work under extremely trying circumstances.

**Newcastle-on-Tyne.**—TROLLEY-BUS TERMINUS.—The Transport Committee has rejected a suggestion by Wallsend Corporation that owing to the unsatisfactory condition of Park Road railway bridge the trolley-bus terminus should be fixed at the south side of the bridge instead of the north side, so that trolley-buses should not pass under the bridge. Wallsend Corporation has therefore decided to petition Parliament with a view to having the bridge improved to provide better facilities for road traffic passing under it.

**South Shields.**—TROLLEY-BUS EXTENSION.—The Town Council has decided to meet the cost of extending the trolley-bus service (£4,300) out of revenue.

# FINANCIAL SECTION

## *Company News. Stock Exchange Activities.*

## Reports and Dividends

**The Atlas Electric & General Trust, Ltd.,** reports a net revenue for the year to March 31st of £115, 983, as compared with £118,677 for the previous year. The preference dividend of 7 per cent. is paid and £159,695 is carried forward (against £155,165 brought in).

In a statement issued by Mr. W. Sandford Poole, chairman of the company, it is stated that the directors are of opinion that there are no grounds calling for the appointment of a committee of investigation, as suggested by a shareholder. But for adverse conditions affecting the Montevideo tramway enterprise, which were beyond the board's control, the Trust would be earning a dividend on its ordinary shares.

The company announces the payment of the interim dividend (3½ per cent.) on its 7 per cent. cumulative preference shares.

**Associated Fire Alarms, Ltd.,** reports a profit of £526 for 1942-43 (against £1,126). The dividend for the year is reduced from 6 to 3 per cent. The report says that business has decreased owing to the impossibility of replacing damaged installations and the difficulty of carrying out new ones.

**Ransome & Marles Bearing Co., Ltd.,** reports a net profit for the year ended June 30th amounting to £122,699 after providing for taxation. In the previous year the figure was £119,434. A sum of £76,872 (£76,305) was brought in and after providing for war damage premiums £12,643 (£15,867) and reserve for contingencies £35,000 (£30,000), a final dividend of 11 per cent., making 20 per cent. (same), is to be paid and £78,928 is to be carried forward.

**De la Rue Plastics, Ltd.,** has acquired all the shares of Hammans Industries, Ltd., and has taken over that company's subsidiaries. Mr. J. Eerdmans, managing director of Hammans Industries, has joined the board of De la Rue Plastics, Ltd.

**The Jerusalem Electric & Public Service Corporation, Ltd.,** states that the profit for the year to March 31st last was £77,551 (Palestinian currency) as compared with £67,267 for the preceding year. After meeting taxation and providing for capital amortisation, depreciation and renewals, etc., it is proposed to maintain the ordinary dividend at 5 per cent., leaving £9,526 (£9,762) to be carried forward. Continued progress is reported. Although operating costs have risen the tariffs have so far been maintained at pre-war levels.

**African Cables, Ltd.,** reports a profit for 1942 of £61,410, as compared with £56,989 in the previous year. The dividend has been increased from 12½ per cent. to 15 per cent. The plant has met most demands on it in spite of increasing supply difficulties.

**The Power Corporation of Canada, Ltd.,** reports that gross earnings, which in 1941-42 declined from $1,607,506 to $1,571,732, recovered to $1,605,511 in the year ended June 30th last. Taxes, however, were substantially greater ($139,338 against $57,770) and after provision for these and other charges the net

profit was $755,509 against $797,817 in the previous year. A sum of $2,072,865 is carried forward against $2,061,265 brought in. Mr. A. J. Nesbitt, president, stated that the utilities showed an increase of nearly 2 per cent. in output during the year under review and there was an increase of 6,163 in the number of customers served.

The **Cables Investment Trust, Ltd.**, has announced a final dividend of 3 per cent., again making 5 per cent., less tax, for the year.

**Strand Electric Holdings, Ltd.**, are to pay a dividend of 10 per cent. on their ordinary shares, as compared with a distribution of 7½ per cent. last year.

The **Rawlplug Co., Ltd.**, is maintaining its interim dividend at 10 per cent.

**Pinchin Johnson & Co., Ltd.**, are again paying an interim ordinary dividend of 2½ per cent., less tax.

# New Companies

**Industrial X-Rays, Ltd.**—Private company. Registered October 6th. Capital, £2,000. Objects: To carry on the business of industrial X-ray and electro-medical engineers, etc. Directors: T. B. Wolverson and Charlotte Wolverson, both of Ferndale, Thompson Street, The Manor, Willenhall, Staffs. Registered office: 54, Walsall Street, Willenhall, Staffs.

**Suppliers to Factories, Ltd.**—Private company. Registered October 6th. Capital, £200. Objects: To carry on the business of manufacturers of and dealers in electrical gear and plant, dynamos, motors, lamps, radiators, fires, cookers, domestic appliances, etc. Permanent directors: A. W. M. Hartley and Catherine M. Hartley, both of Knowles Farm, Meole Brace, Shrewsbury. Registered office: 17-18, Pride Hill, Shrewsbury.

**Kirby Hill Electric, Ltd.**—Private company. Registered October 2nd. Capital, £100. Objects: To carry on the business of manufacturers of, and wholesale and retail dealers in, electrical equipment, including car radio and other wireless equipment, etc. Directors: F. H. Kirby, 217, Sarehole Road, Hall Green, Birmingham, and J. W. Hill, 424, Warwick Road, Solihull, Warwickshire. Registered office: 7, Newhall Street, Birmingham.

**Hans Pollak, Ltd.**—Private company. Registered September 28th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, electrical goods and accessories, radio and television components, etc. Subscribers: Sonia Mason, 505, Rodney House, Dolphin Square, S.W.1, and Nellie Symes, 36, Netherhall Gardens, N.W.3. Secretary: Sonia Mason. Registered office: Furnival House, 14-18, High Holborn, London, W.C.1.

**Fine Art Arc Welding Co., Ltd.**—Private company. Registered September 28th. Capital, £2,000. Objects: To carry on the business of welders, electrical, motor and general engineers, electricians, wireless dealers, etc. Directors: H. J. C. Wiseman, 147, Wanstead Park Road, Ilford, Essex, and H. H. Rose, 9, Grosvenor Gardens, East Sheen, S.W.14. Registered office: 147, Wanstead Park Road, Ilford, Essex.

# Companies' Returns

## Statements of Capital

**Electric & General Investment Co., Ltd.**—Capital, £201,500 in £60,000 ordinary stock and 141,500 ordinary shares of £1 each. Return dated July 14th, 1943. £60,000 stock taken up. £22,000 paid. £38,000 considered as paid. Mortgages and charges: £93,870.

**Morley Electrical Engineering Co., Ltd.**—Capital, £5,000 in 5,000 shares of £1 each. Return dated July 22nd, 1943. All shares taken up. £3,980 paid. £1,020 considered as paid. Mortgages and charges: £1,000.

**Isle of Arran Electric Light & Power Co., Ltd.**—Capital, £20,000 in £1 shares (19,000 ordinary and 1,000 preference). Return dated July 28th, 1943. All shares taken up. £18,800 paid. £1,200 considered as paid. Mortgages and charges: Nil.

**Robert W. Blackwell & Co., Ltd.**—Capital, £50,000 in £1 shares (all ordinary). Return dated December 29th, 1942 (filed August 12th, 1943). All shares taken up. £18,338 paid. £31,662 considered as paid. Mortgages and charges: Nil.

**Frank Wall & Co., Ltd.**—Capital, £1,000 in 1,000 shares of £1 each. Return dated July 19th, 1943. All shares taken up. £1,000 paid. Mortgages and charges: Nil.

**Monks & Byrne, Ltd.**—Capital, £2,500 in £1 shares. Return dated May 14th, 1941 (filed March 24th, 1943). 2,000 shares taken up. £1,350 paid. £650 considered as paid. Mortgages and charges: Nil.

**E. M. F. (Electrical), Ltd.**—Capital, £5,000 in £1 shares. Return dated December 9th, 1942 (filed March 18th, 1943). All shares taken up. £5,000 paid. Mortgages and charges: £3,013.

## Mortgages and Charges

**North-Eastern Electric Supply Co., Ltd.**—Satisfaction to the further extent of £65,119 on July 30th, 1943, of trust deed dated December 30th, 1933, and registered January 17th, 1934, originally securing £2,500,000.

**Franco British Electrical Co., Ltd.**—Mortgage on proceeds of certain hiring agreements of Reflex Signs, dated September 10th, to secure £20,000. Holders: United Dominions Trust, Ltd., Regis House, King William Street, E.C.

**Medway Relay Service, Ltd.**—Satisfaction in full on September 14th, of mortgage dated April 23rd, 1935, and registered May 1st, 1935, securing all moneys due or to become due from the company to Midland Bank, Ltd.

**Brighton Lighting and Electrical Engineering Co., Ltd.**—Satisfaction on September 20th, 1943, of mortgage dated November 12th, 1930, and registered November 20th, 1930.

# Liquidations

**Engineering & Lighting Equipment Co., Ltd.** (old company).—Meeting held Nov. 18th, 1940, to receive account of the winding-up by liquidator, Mr. G. Little. This meeting was adjourned and the adjourned meeting will be held on November 15th, 1943, at Sphere Works, St. Albans, to hear any explanation that may be furnished by the liquidator and to pass an extraordinary resolution as to the disposal of the books and papers of the company and of the liquidator.

# STOCKS AND SHARES

TUESDAY EVENING.

STOCK Exchange markets and prices are attracting a good deal of public attention, and it will be noticed by reference to our list of quotations that values are fairly well held in most sections. Business is somewhat sporadic and spasmodic. The little spurt which occurred in gilt-edged stocks petered out in less than a week, but so far as the best-class ordinary shares are concerned, the prices have maintained their recent strength and the 6 per cent. preference shares, which two or three weeks ago showed a disposition to decline, have recovered from the slight dullness which then overtook them. A bout of lively speculation in South African mining shares is said to have led to selling of shares in other parts of the Stock Exchange in order to provide money with which to finance operations in the latest favourites.

**Home Railway Bargain**

Controversy goes on in lively fashion around the question of what the Government ought to allow the Home Railways in respect of the present unexpectedly good earnings. The Government bargain with the railways was to pay them £43½ million per annum during the war and for one year afterwards. It is estimated that the railways' earnings are approaching £100 million for the current year. These earnings have been swollen, of course, by war conditions. Prices show little alteration on the week. London Passenger Transport "C" stock has been changing hands fairly frequently around 70. Southern 5 per cent. preference is up 10s. at 108½. It is still one of the cheapest stocks in the trustee list.

**Fluctuations in Prices**

Henley's 5s. ordinary shares at 25s. 3d. are better by the amount of the pence. The company has declared its regular 5 per cent. interim dividend. Henley's is an exceedingly strong concern and for several years past has paid 20 per cent. per annum on the ordinary shares. Callender's recovered the dividend of 1s. recently deducted from the price, which remains at 5½. British Insulated at 5½ have lost ⅛. Johnson & Phillips eased off to 69s. 6d. On the other hand, rises are recorded in Brush, Burco, Crabtree, Walsall Conduits and Westinghouse Brake. The last two gained 1s each to 45s. and 67s. 3d. respectively. Among telephone shares Automatics put on 6d. to 59s. 6d.; Ericssons are 1s. lower at 52s. ; Hall Telephones at 25s. 9d. gained a few pence. Strand Electrics at 7s. 9d. are but 3d. higher, in spite of the dividend being advanced to 10 per cent., an increase of 2½ per cent. Interest in radio shares has temporarily subsided. The market in them is eclipsed by the superior drawing power of mining speculation. Cossor receded to 24s. E.M.I. gave way to 27s. 6d. upon the idea that the forthcoming dividend may be disappointing. Philco have kept close to 14s. 6d.

**Aron's Good Dividend**

Aron Electricity Meter ordinary shares have risen 8s. 9d. to 55s. upon the announcement of a dividend making 15 per cent. as against 10 per cent. for the previous year ended March 31st, 1942. This in its turn went against 7½ per cent. for the year ended March, 1941. In the previous twelvemonth, the company made a loss, and the ordinary shares went without a dividend after having received 15 per cent. for five consecutive years, 1935–1939 inclusive. The price of the shares during the last decade has undergone sharp fluctuations, being down to 13s. 9d. in 1940, which compared with 69s. 6d. in 1936. The present 15 per cent. restores the company's dividend to the level of the 1939 distribution. The shares came into demand upon the announcement, but have been difficult to buy. At 55s. the return is practically 5½ per cent on the money, a yield which may be held to justify further improvement in the quotation.

**Overseas**

Brazilian Tractions jumped 2 dollars when the dividend was raised a fortnight ago, but the advance served to bring in sellers, and the price went back 1¼ to 30. The shares are actively dealt in by the Montreal Stock Exchange, where the recent sentiment has been affected by dullness in Wall Street, due to proposals of heavily increased taxation to meet war needs. International "Tel & Tel." declined to 16 in correspondence with the New York price. Argentine issues met with renewed, though not sustained, favour, and Anglo-Argentine Tramway stocks and shares fell back to their previous levels after going better. Mexican Light & Power fives are 1 down at 106½, although Mexicans as a whole have been in some request. No changes occurred in Victoria Falls Power shares or in those of the Indian group.

**Atlas Electric**

This week the meeting of the Atlas Electric Trust was expected to produce lively proceedings. The preliminary statement issued by the company showed that the Montevideo Tramways receipts are on the increase. The rumour is still current that the company may be able to find a purchaser for the undertaking, which the Atlas controls. On the question of assets, the company's holdings show a substantial improvement as compared with a year ago. The ordinary shares have been up to 8s. 3d., reacting a trifle to 7s. 9d. As things are at present, the possibility of a dividend on the ordinary shares looks remote, but if the sale of the Montevideo Tramways should be

(*Continued on page* 524)

# ELECTRICAL INVESTMENTS

## *Prices, Dividends and Yields*

| Company | Dividend Previous | Dividend Last | Middle Price Oct. 12 | Rise or Fall | Yield p.c. £ | s. | d. |
|---|---|---|---|---|---|---|---|
| **Home Electricity Companies** | | | | | | | |
| Bournemouth and Poole | 12½ | 12½ | 59/6 | +6d. | 4 | 4 | 6 |
| British Power and Light | 6 | 7 | 32/6 | .. | 4 | 4 | 9 |
| City of London | 7 | 7 | 28/– | .. | 5 | 0 | 0 |
| Clyde Valley | 8 | 8 | 39/6 | .. | 4 | 1 | 0 |
| County of London | 8 | 8 | 40/6 | .. | 3 | 19 | 0 |
| Edmundsons: | | | | | | | |
| 7% Pref. | 7 | 7 | 34/– | .. | 4 | 2 | 4 |
| Ord. | 6 | 6 | 28/6 | .. | 4 | 4 | 3 |
| Elec.Dis.Yorkshire | 9 | 9 | 44/– | .. | 4 | 1 | 10 |
| Elec. Fin. and Securities | 12½ | 12½ | 53/ | .. | 4 | 14 | 4 |
| Elec. Supply Corporation | 10 | 10 | 45/6 | .. | 4 | 8 | 0 |
| Isle of Thanet | Nil | Nil | 18/– | .. | | — | |
| Lancs. Light and Power | 7½ | 7½ | 34/6 | .. | 4 | 7 | 0 |
| Llanelly Elec. | 5½ | 6 | 25/6 | .. | 4 | 14 | 1 |
| Lond.Assoc.Electric | 4 | 3 | 23/6 | .. | 2 | 11 | 0 |
| London Electric | 6 | 6 | 27/6 | +1/– | 4 | 7 | 3 |
| London Power Red. Deb. | 5 | 5 | 104½ | .. | 4 | 15 | 7 |
| Metropolitan E.S. | 8 | 8 | 41/– | .. | 3 | 18 | 0 |
| Midland Counties | 8 | 8 | 39/– | .. | 4 | 2 | 0 |
| Mid. Elec. Power | 9 | 9 | 42/6 | .. | 4 | 4 | 9 |
| Newcastle Elec. | 7 | 7 | 31/– | .. | 4 | 10 | 5 |
| North Eastern Elec.: | | | | | | | |
| Ordinary | 7 | 7 | 32/6 | .. | 4 | 16 | 2 |
| 7% Pref. | 7 | 7 | 33/6 | .. | 4 | 3 | 7 |
| Northampton | 10 | 10 | 47/6 | .. | 4 | 4 | 0 |
| Notting Hill 6% Pref. (£10) | 6 | Nil | 10 | .. | | — | |
| Northmet Power: | | | | | | | |
| Ordinary | 7 | 7 | 38/– | .. | 3 | 13 | 8 |
| 6% Pref. | 6 | 6 | 30/– | .. | 4 | 0 | 0 |
| Richmond Elec. | 6 | 6 | 26/– | .. | 4 | 12 | 4 |
| Scottish Power | 8 | 8 | 38/– | .. | 4 | 4 | 4 |
| Southern Areas | 5 | 5 | 22/– | .. | 4 | 10 | 11 |
| South London | 7 | 7 | 26/6 | .. | 5 | 5 | 8 |
| West Devon | 5 | 5 | 23/6 | .. | 4 | 5 | 0 |
| West Glos. | 4½ | 3½ | 24/– | .. | 2 | 18 | 4 |
| Yorkshire Elec. | 8 | 8 | 41/– | .. | 3 | 18 | 0 |
| **Overseas Electricity Companies** | | | | | | | |
| Atlas Elec. | Nil | Nil | 7/9 | .. | | — | |
| Calcutta Elec. | 7* | 6* | 38/– | .. | 3 | 3 | 2 |
| Cawnpore Elec. | 10 | 10 | 34/6 | .. | 5 | 16 | 0 |
| East African Power | 7 | 7 | 33/6 | .. | 4 | 3 | 7 |
| Jerusalem Elec. | 7 | 5 | 30/6 | .. | 3 | 5 | 7 |
| Kalgoorlie (10/–) | 5 | 5 | 10/– | .. | 5 | 0 | 0 |
| Madras Elec. | 4* | Nil | 22/6 | .. | | — | |
| Montreal Power | 1½ | 1½ | 27½ | –1½ | 5 | 1 | 8 |
| Palestine Elec."A" | 4* | 5* | 41/6 | –6d. | 2 | 8 | 2 |
| Perak Hydro-elec. | 6 | 7 | 14/– | .. | | — | |
| Shawinigan Power | 83cts. | 90cts. | 19 | .. | | — | |
| Tokyo Elec. 6% | 6 | 6 | 23 | .. | | — | |
| Victoria Falls Power | 15 | 15 | 4 1/16 | .. | 3 | 9 | 7 |
| Whitehall Inv.Pref. | — | — | 25/– | .. | 4 | 0 | 0 |

| Company | Dividend Previous | Dividend Last | Middle Price Oct. 12 | Rise or Fall | Yield p.c. £ | s. | d. |
|---|---|---|---|---|---|---|---|
| **Public Boards** | | | | | | | |
| Central Electricity: | | | | | | | |
| 1955–60 (Civil Defence) | — | 3 | 99½ | .. | 3 | 0 | 4 |
| 1955–75 | 5 | 5 | 113½ | .. | 4 | 8 | 0 |
| 1951–73 | 4½ | 4½ | 107 | .. | 4 | 4 | 1 |
| 1963–93 | 3½ | 3½ | 102 | .. | 3 | 8 | 8 |
| 1974–94 | 3½ | 3½ | 98½xd | +1 | 3 | 6 | 0 |
| LondonElec.Trans. Ltd. | 2½ | 2½ | 97 | .. | 2 | 11 | 3 |
| London & Home Counties 1955–75 | 4½ | 4½ | 111 | .. | 4 | 1 | 1 |
| Lond.Pass.Trans.: | | | | | | | |
| A | 4½ | 4½ | 115½ | .. | 3 | 18 | 0 |
| B | 5 | 5 | 115½ | .. | 4 | 6 | 7 |
| C | 2⅞ | 3 | 69 | .. | 4 | 7 | 0 |
| WestMidlandsJ.E.A. 1948–68 | 5 | 5 | 109 | .. | 4 | 11 | 9 |
| **Telegraph and Telephone** | | | | | | | |
| Anglo-Am. Tel.: | | | | | | | |
| Pref. | 6 | 6 | 115½ | .. | 5 | 4 | 0 |
| Def. | 1½ | 1½ | 27½ | .. | 5 | 9 | 1 |
| Anglo-Portuguese | 8 | 8 | 24/– | .. | 6 | 13 | 4 |
| Cable & Wireless: | | | | | | | |
| 5½ Pref. | 5½ | 5½ | 112 | .. | 4 | 18 | 3 |
| Ord. | 4 | 4 | 78 | .. | 5 | 2 | 7 |
| CanadianMarconi$1 | Nil | 4cts. | 9/9 | +3d. | | — | |
| Globe Tel. & Tel.: | | | | | | | |
| Ord. | 8½* | 5* | 38/–xd | +1/– | 2 | 12 | 8 |
| Pref. | 6 | 6 | 29/–xd | +1/– | 4 | 2 | 9 |
| Great NorthernTel. (£10) | Nil | Nil | 23½ | +½ | | — | |
| Inter. Tel. & Tel. | Nil | Nil | 16 | –1 | | — | |
| Marconi-Marine | 7½ | 7½ | 32/9 | .. | 4 | 11 | 7 |
| Oriental Tel. Ord. | 16 | 10 | 45/– | .. | | — | |
| Telephone Props. | 6 | Nil | 15/– | .. | | — | |
| Tele.Rentals (5/–) | 10 | 10 | 11/– | .. | 4 | 11 | 0 |
| **Traction and Transport** | | | | | | | |
| Anglo-Arg.Trans.: | | | | | | | |
| First Pref. (£5) | Nil | Nil | 3/6 | .. | | — | |
| 4% Inc. | Nil | Nil | 12 | .. | | — | |
| Brit.Elec.Traction: | | | | | | | |
| Def. Ord. | 45 | 45 | 1125 | .. | 4 | 0 | 0 |
| Pref. Ord. | 8 | 8 | 175 | .. | 4 | 11 | 5 |
| Bristol Trams | 10 | 10 | 52/– | .. | 3 | 17 | 0 |
| Brazil Traction | $1 | $1½ | 30 | –1½ | | — | |
| Calcutta Trams. | 5½ | 6½ | 41/– | .. | 3 | 3 | 5 |
| Cape Elec. Trams | 5 | 6 | 24/– | .. | 5 | 0 | 0 |
| Lancs.-Transport | 10 | 10 | 44/3xd | .. | 4 | 10 | 4 |
| Mexican Light: | | | | | | | |
| 1st Bonds | 5 | 5 | 106½ | –1 | 4 | 14 | 0 |
| Rio 5% Bonds | 5 | 5 | 105½ | .. | 4 | 14 | 9 |
| Southern Rly.: | | | | | | | |
| 5% Prefd. | 5 | 5 | 75½ | .. | 6 | 12 | 4 |
| 5% Pref. | 5 | 5 | 108½ | +½ | 4 | 12 | 2 |
| T. Tilling | 10 | 10 | 57/– | .. | 3 | 10 | 2 |
| West Riding | 10 | 10 | 43/– | .. | 4 | 13 | 0 |

(*Continued on next page*)

* Dividends are paid free of Income Tax.

| Company | Dividend Previous | Dividend Last | Middle Price Oct. 12 | Rise or Fall | Yield £ s. d. |
|---|---|---|---|---|---|
| **Equipment and Manufacturing** | | | | | |
| Aron. Elec. Ord. . | 10 | 15 | 55/- | +$\frac{5}{16}$ | 5 9 1 |
| Assoc. Elec. : | | | | | |
| Ord. .. .. | 10 | 10 | 50/6 | −6d. | 3 19 0 |
| Pref. .. .. | 8 | 8 | 38/- | .. | 4 4 3 |
| AutomaticTel.&Tel. | 12½ | 12½ | 59/6 | +6d. | 4 4 0 |
| Babcock & Wilcox | 11 | 11 | 47/6 | +3d. | 4 12 7 |
| British Aluminium | 10 | 10 | 47/- | .. | 4 5 1 |
| British Insul. Ord. | 20 | 20 | 5½ | −$\frac{1}{16}$ | 3 12 9 |
| British Thermostat (5/-) .. .. | 18½ | 18½ | 19/- | .. | 4 17 4 |
| British Vac.Cleaner (5/-) .. .. | 15 | 30 | 27/6 | .. | 5 9 1 |
| Brush Ord. (5/-) | 6 | 8 | 9/3 | +3d. | 4 6 6 |
| Burco (5/-) .. | 15 | 15 | 16/3 | +6d. | 4 12 3 |
| Callender's .. | 15 | 20 | 5½xd | +6d. | 3 18 2 |
| ChlorideElec.Storage | 15 | 15 | 82/6 | .. | 3 13 0 |
| Cole, E. K. (5/-) | 7 | 10 | 27/- | .. | 1 17 2 |
| Consolidated Signal | 17 | 24 | 5½ | .. | 4 3 6 |
| Cossor, A. C. (5/-) | 7½* | 10* | 24/- | −6d | 2 1 8 |
| Crabtree (10/-) .. | 17½ | 17½ | 39/9 | +9d. | 4 8 0 |
| Crompton Parkinson Ord. (5/-) .. | 20 | 20 | 26/- | .. | 3 17 0 |
| E.M.I. (10/-) .. | 6 | 6 | 27/6 | −6d. | 2 3 8 |
| Elec.Construction | 10 | 12½ | 50/- | .. | 5 0 0 |
| Enfield Cable Ord. | 12½ | 12½ | 58/- | .. | 4 6 2 |
| English Electric. . | 10 | 10 | 48/- | .. | 4 3 4 |
| EnsignLamps(5/-) | 25 | 25 | 22/6 | .. | 5 11 1 |
| Ericsson Tel. (5/-) | 22* | 20* | 52/- | −1/- | 1 18 6 |
| Ever Ready (5/-) | 40 | 40 | 40/- | .. | 5 0 0 |
| Falk Stadelmann | 7½ | 7½ | 32/- | .. | 4 13 9 |
| Ferranti Pref. .. | 7 | 7 | 29/6 | .. | 4 15 0 |
| G.E.C. : Pref. .. | 6½ | 6½ | 32/- | .. | 4 1 3 |
| „ Ord. .. | 17½ | 17½ | 91/- | .. | 3 17 0 |
| Greenwood&Batley | 15 | 15 | 42/6 | .. | 7 1 2 |
| HallTelephone(10/-) | 12½ | 12½ | 25/9 | +3d. | 4 17 0 |
| Henley's (5/-) .. | 20 | 20 | 25/3 | +3d. | 3 19 3 |
| 4½% Pref. .. | 4½ | 4½ | 23/- | .. | 3 18 3 |
| Hopkinsons .. .. | 15 | 17½ | 62/- | .. | 5 13 0 |
| India Rubber Pref. | 5½ | 5½ | 21/6 | .. | 5 2 4 |
| Intl. Combustion | 30 | 30 | 6½ | .. | 4 16 0 |
| Johnson & Phillips | 15 | 15 | 69/6 | −6d. | 4 6 4 |
| LancashireDynamo | 20 | 22½ | 92/9 | .. | 4 17 0 |
| Laurence,Scott(5/-) | 15 | 12½ | 11/6 | −6d. | 5 8 8 |
| London Elec.Wire | 7½ | 7½ | 32/6 | .. | 4 12 3 |
| Mather & Platt .. | 10 | 10 | 52/6 | .. | 3 16 0 |
| Metal Industries(B) | 5 | 8 | 45/- | .. | 3 11 2 |
| Met. Elec.CablePref. | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Murex .. .. | 20 | 20 | 5½ | .. | 3 18 0 |
| Pye Deferred (5/-) | 25 | 25 | 25/- | .. | 5 0 0 |
| Revo (10/-) .. | 17½ | 17½ | 40/- | .. | 4 7 6 |
| Reyrolle .. | 12½ | 12½ | 70/- | .. | 3 11 5 |
| Siemens Ord. .. | 7½ | 7½ | 35/3 | .. | 4 5 1 |
| Strand Elec. (5/-) | 7½ | 10 | 7/9 | +6d. | 6 9 0 |
| Switchgear&Cow-ans (5/-) .. | 10 | 20 | 18/- | .. | 5 11 1 |
| T.C.C. (10/-) .. | 5 | 5 | 20/- | .. | 2 10 0 |
| T.C. & M. .. | 10 | 10 | 53/- | .. | 3 15 6 |
| TelephoneMfg.(5/-) | 9 | 9 | 12/- | .. | 3 15 0 |
| Thorn Elec. (5/-) | 20 | 20 | 21/9 | .. | 4 12 0 |
| Tube Investments | 20 | 20 | 93/- | .. | 4 6 2 |
| Vactric (5/-) .. | Nil | Nil | 13/9 | .. | — |
| Vickers (10/-) .. | 10 | 10 | 19/- | +3d. | 5 5 3 |
| WalsallConduits(4/-) | 55 | 55 | 45/- | +1/- | 4 17 9 |
| Ward & Goldstone (5/-) .. .. | 20 | 20 | 26/- | .. | 3 17 0 |
| WestinghouseBrake | 10 | 12½ | 67/3 | +1/- | 3 14 1 |
| West, Allen (5/-) | 7½ | 7½ | 7/- | −3d. | 5 7 2 |

* Dividends are paid free of Income Tax.

## Stocks and Shares (*Continued from page* 522)

carried out, this would provide the company with cash, or securities, the interest on which might conceivably be used for payment of an ordinary share dividend. The last distribution on the shares was in July, 1932, when proprietors received a lordly 2$\frac{3}{8}$d. per share.

### Shares on Offer

While County of London Electric ordinary shares give a return of no more than £3 17s. per cent. at the present price of 41s. 6d., at which 1,000 shares are on offer, Llanelly & District Electric ordinary can be bought, as to 2,500 shares, at 25s. 3d., to pay 4½ per cent. on the basis of the last dividend of 6 per cent. This went against 5½ per cent. paid by the company in each of the three preceding years. The dividend on the shares is paid annually, in March.

Edmundsons give a return of 4½ per cent. at 28s. 3d. Here, 5,000 shares are on offer at the price mentioned. The company's year ends with March, and dividends are paid in June and December. A fair line of Lancashire Electric Light & Power ordinary is on offer at 34s. 6d., yielding at that price £4 6s. 9d. per cent. on the annual dividend of 7½ per cent. distributed for several years past. The Mid-Cheshire Electricity Supply Co. pays 8 per cent. on its ordinary shares, and of these there are 1,000 to be obtained at 38s. 3d., giving an income of £4 3s. 6d. per cent. As in the case of the Llanelly Company, dividends are paid once a year, in March.

### Delays in Delivery

Prices have reached a high plane, but this seems to have no deterrent effect upon the investor's appetite for securities. Dealers in the Stock Exchange markets, admitting anxiety to supply the public with what they require, will not infrequently offer to sell stock provided the purchaser agrees to refrain from pressing for delivery within the time appointed for settling a transaction under to-day's conditions of cash dealing. Nevertheless, would-be purchasers are insistent, and the Stock Exchange dealers go on selling stock, though they may have none on the book, and do not know where to go for it. The realisation of deceased accounts may bring in occasional sellers, but the present buyer is candidly warned that he may have to wait some time before his bargain can be completed.

# NEW PATENTS

## *Electrical Specifications Recently Published*

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

BRITISH Insulated Cables, Ltd., and C. H. M. Thorpe.—" Precision device for adjusting the position of instrument or machine parts." 4797. April 11th, 1942. (556181.)

British Insulated Cables, Ltd., London Passenger Transport Board, T. C. Broom and H. J. Powell.—" Electric current collectors." Cognate applications 5672/42 and 7346/42. April 28th, 1942. (556184.)

British Thermostat Co., Ltd., and W. F. F. Martin-Hurst.—" Electrical relay devices." 14642. October 19th, 1942. (556235.)

British Thomson-Houston Co., Ltd.—" Starting apparatus for electric discharge lamps." 3421/42. March 18th, 1941. (556112.) " Electric control systems for the transmission of electric energy to a load circuit through capacitance storage apparatus." 3499/42. March 20th, 1941. (556118.) " Holders for tubular electric lamps." 5301/42. April 23rd, 1941. (556130.) " Contact structures for electric circuit interrupters." 5843/42. May 1st, 1941. (556185.) " Telemetering systems." 13225/42. September 18th, 1941. (556259.)

A. Buchi.—" Cooling devices for turbine rotors." 11801/41. September 21st, 1940. (556105.)

F. L. Campion and B.M.A.C., Ltd.—" Holder for electric lamps." 5251. April 20th, 1942. (556129.)

Chloride Electrical Storage Co., Ltd., and H. C. Jones.—" Electric accumulators." 17216. December 3rd, 1942. (556262.)

Curtis Manufacturing Co., Ltd., and B. S. Woodmancy.—" Electric knife switches." 3827. March 23rd, 1942. (556245.)

G. F. J. Dandridge.—" Electric hand torches." 11494. August 17th, 1942. (556263.)

Dr. Rosin Industrial Research Co., Ltd., and W. Deutsch.—" Electro-separators." 3532/3. March 17th, 1942. (556153/4.)

Ferranti, Ltd., and L. Atkinson.—" Automatic control apparatus." 4521. April 4th, 1942. (556179.)

Ferranti, Ltd., and J. H. Watkiss.—" Electric fires." 8982. June 30th, 1942. (556255.)

Foster Transformers & Switchgear, Ltd., and R. G. Lowe.—" Withdrawable electric switchgear structures." 2129. February 18th, 1942. (556215.)

General Electric Co., Ltd., L. C. Jesty and J. Sharpe.—" Combinations of cathode-ray tubes with circuit elements for operating them." 855. January 15th, 1940. (556141.)

G. A. Juhlin and Metropolitan-Vickers Electrical Co., Ltd.—" Ward-Leonard systems." 3847. March 23rd, 1942. (556246.)

Lancashire Dynamo & Crypto, Ltd., and W. Stansfield.—" Electric generators for constant current systems." 5387. April 22nd, 1942. (556132.) " Electric motors for constant current systems." 5388. April 22nd, 1942. (556133.)

G. Hagerup-Larssen.—" Furnace electrode structures." 9104. July 1st, 1942. (556202.)

Marconi's Wireless Telegraph Co., Ltd.—" Frequency divider networks, particularly for frequency or phase modulation receivers." 4109/42. March 29th, 1941. (556171.)

L. G. Mouchel & Partners, Ltd., and P. J. Gerard.—" Water-cooling towers." 12592. September 7th, 1942. (556230.)

Nife Batteries, Ltd., and W. S. Thomson.—" Plates for electric storage batteries." 10808. August 1st, 1942. (556223.)

J. F. O'Brien.—" Electricity conductor unit and method of using same." 3681/42. March 13th, 1941. (556243.)

H. J. Oesterreicher.—" Measuring instruments incorporating electric indicating means." 4204. March 30th, 1942. (556177.)

W. Partington and Metropolitan-Vickers Electrical Co., Ltd.—" Carbon pile resistance regulating systems for dynamo-electric machines." 8076. (June 12th, 1942. (556221.)

Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken).—" Devices of the kind comprising a discharge tube in which the electrons are concentrated in a beam and traverse a velocity control space." 14787. November 17th, 1941. (556211.)

Rover Co., Ltd., and P. A. Scott-Iversen.—" Electromagnetically operated clutches or brakes." 4938. April 15th, 1942. (556182.)

Sangamo Weston, Ltd., and M. G. McBride.—" Electrical indicating instruments of the ratiometer type." Cognate applications 10890/42 and 13238/42. August 5th, 1942. (556258.)

Siemens Bros. & Co., Ltd., D. A. Christian and D. P. Long.—" Telephone systems." 7547. June 3rd, 1942. (556192.)

Standard Telephones & Cables, Ltd.—" Method and means for joining hollow bodies." 4161/42. December 17th, 1940. (556172.) " Construction and arrangement of electrodes in electron-discharge devices." Cognate applications 6544/42 and 6545/42. May 17th, 1941. (556188.) " Attenuation equaliser." 12841/42. September 27th, 1941. (556231.)

Standard Telephones & Cables, Ltd., and C. W. Earp.—" Arrangement for conversion of frequency modulation to phase modulation and the application thereof to the production of a frequency modulated wave from a frequency stable oscillator." 5358. April 25th, 1941. (556208.)

A. H. Stevens (Electronic Laboratories, Inc.).—" Electrical systems for converting direct current into alternating current." 3623. March 18th, 1942. (556161.)

Wagner Electric Corporation.—" Combined fluid motor and slack adjuster." 3601/42. March 1st, 1941. (556158.)

Westinghouse Brake & Signal Co., Ltd., S. A. Stevens and A. H. B. Walker.—" Mechanical rectifiers or convertors for alternating electric currents." 3587. March 18th, 1942. (556157.)

Westinghouse Brake & Signal Co., Ltd., L. E. Thompson and A. Jenkins.—" Alternating electric current rectifiers of the selenium type." 3508. March 17th, 1942. (556152.)

H. A. Wilson Co.—" Electric switch contacts." 15406/42. October 29th, 1941. (556236.)

# CONTRACT INFORMATION

## *Accepted Tenders and Prospective Electrical Work*

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.*

**Edinburgh.**—October 16th. Electricity Department. (*a*) installation of electric lighting in West Pilton housing area, second development, second section, 192 houses; and (*b*) installation of electric lighting in West Pilton housing area, third development, second section, 140 houses. Forms, etc., from Engineer's Office, Dewar Place.

**Macclesfield.**—November 17th. Electricity Department. 11-kV switchgear. (See this issue.)

## Orders Placed

**Cardiff.**—Electricity Committee. Accepted. Three storage batteries for electric vehicles (£577).—W. Lewis & Sons. Capstan, etc., for coal plant (£328).—Stothert & Pitt. Motors for pumping plant (£898).—Pulsometer Engg. Co. Bearing water recovery plant (£796).—Babcock & Wilcox.

**Manchester.** — Electricity Committee. Accepted. Relinking mechanical stokers at Stuart Street power station.—John Thompson Water Tube Boilers.

**Salford.**—Electricity Committee. Recommended. Extension for twelve months of contract for transformers.—Bryce, Ltd.

**Wallasey.**—Electricity Committee. Accepted. Turbine repairs (£2,600).—English Electric Co.

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Ashbourne.**—Houses for U.D.C.; D. Powell, surveyor, Compton Street.

**Ashby-de-la-Zouch.**—Houses; G. E. Marlow, surveyor, Town Hall.

**Batley.**—Community hall; A. Sykes, secretary, Hostel and Workshops, Blind Institution, Batley.

**Bilston.**—Two school canteen kitchens each for 1,000 meals daily; A. F. B. Sidwick, Town Hall.

**Birkenhead.**—Canteen, Rock Ferry; and Clinic, Woodchurch estate; borough engineer.

**Bolton.**—Works extensions; R. G. Hirst & Son, builders, Steele Street.

**Bournemouth.** — Store, Roumelia Lane; Rothon Radiators, Ltd.

**Brighouse.**—Houses, Rastrick, Southowram and Clifton Common; H. A. Sneezum, borough engineer, Commercial Street.

**Bromsgrove.**—Houses, Stoke Prior; C. E. Cox, surveyor, Rural Council House, Birmingham Road.

**Cheltenham.** — British Restaurant, College Road; G. Gould Marsland, borough surveyor, Municipal Offices, Promenade.

**Coventry.**—Extensions to Stretton nursery (£1,300); city engineer.

**Harrow.**—British Restaurants (£17,154), Rayners Lane, North Harrow and Belmont, for U.D.C.; H. W. Rackham, surveyor, Council Offices, Uxbridge Road, Stanmore.

**Hawarden.**—Houses at Hope and Broughton sites; G. I. Reidford, surveyor, R.D.C. Offices, Hawarden, near Chester.

**Hereford.**—Canteen, Commercial Road; Midland Red Omnibus Co.

**Huntingdonshire.**—Central cooking depots at Huntingdon, Ramsey, Forty Foot, Warboys and Alconbury; county architect, Walden House, Huntingdon.

**Lancashire.**—Additions to Morecambe Grammar School; Edmondson Bros. (Morecambe), Ltd., building contractors, Main Street Saw Mills, Morecambe and Heysham.

Additional accommodation at Grammar School, Whitefield; J. Tinline, Ltd., Parker Street Saw Mills, Bury.

Additions for dining room and classrooms at Chorley Grammar School; E. Tomlinson & Son, Ltd., builders, Forge Street, Leyland, near Preston.

Additions, Gorse Hill Park site, Stretford, for High School for Girls; L. Evans, county architect, County Buildings, Fishergate Hill, Preston.

**Leeds.**—School kitchen, Stainbeck Road; W. S. Cameron, city engineer.

**Macclesfield.**—Central school kitchen; M. Tetlow, borough architect, Pear Tree House, Jordangate, Macclesfield.

**Mansfield.**—Bakery extension, Mount Street; W. Brown.

Corn stores; Welbeck Estates Co., Ltd.

**Matlock.**—Private maternity and nursing home; Miss Higgins, "Brendawood," Jackson Tor Road.

**Oldham.**—Fire station, Jones Street, Royton; J. Hartley, building contractor, Cobden Street, Chadderton, Oldham.

**Ripon.**—Reinstatement of Opera House after fire; Victoria Opera House (Ripon), Ltd., Low Skellgate, Ripon.

**Sale.**—Alterations to fire station, and erection of control room and garages for N.F.S.; J. Paley Parrish, architect, "Woodgarth," 30, Broad Road.

**Sheffield.**—School huts (£19,150), and canteen for official staff; city engineer.

**Shrewsbury.**—School canteen kitchen at Harlescott; A. W. Ward, borough surveyor, Guildhall.

**West Hartlepool.**—Provision of dining centres and sculleries at schools in connection with the school meals plan; borough engineer.

**York.**—Nursery, Acomb; city engineer.

Additions, Mount School for Girls, Dalton Terrace; managers.